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J. Gurcan Putnam

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PROCEEDINGS

OF THE

DAVENPORT ACADEMY

OF

NATURAL SCIENCES.

VOLUME III.

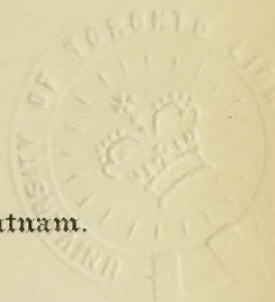
1879-1881.

In Memoriam — Joseph Duncan Putnam.

DAVENPORT, IOWA :

PUBLISHED BY THE ACADEMY OF NATURAL SCIENCES.

1883.



PUBLICATION COMMITTEE—1882-83.

Mrs. M. L. D. PUTNAM, *Chairman*.

Dr. C. C. PARRY.

Rev. W. H. BARRIS.

W. H. PRATT.

Dr. C. H. PRESTON.

The authors of the various papers are alone responsible for what is contained in them.
The date of the printing of each sheet is printed in each signature line.

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IN MEMORY OF JOSEPH DUNCAN PUTNAM.

(ON RECEIVING A PICTURE.)

Thy gentle, thoughtful face is good to look on,
For, like an open window in a mansion
Finely set, it bids me gaze far out
On the wide fields of nature's busy life.
Some faces are but rents in the blank wall
Of the unknown; rough openings
Into darkness, into doubt; while others
Are quick conjurers of evil and of hate;
Giving glimpses into regions of distress
And torment dire.
Thanks for a face so kindly fair,
That opens in the minds of other men
A window towards the beauty of God's world.
More than thine eyes we see, for through them
We behold the things they love to look on.
Threading the maze of myriad insect life,
We follow thy quick sight and loving ear,
To note the ways of nature's tiniest children,
And perceive the little industries that thrive
In every nook and cranny of the earth,
Filling it full of interest.
To know thee is to know much more
Of wisdom and of goodness in the
- Universal plan.
Looking at thee, I'm minded to behold
Something that is not merely love of nature
In her charming, changing forms.
My vision travels on around the world
Of happy, wholesome interests, that nature
And her sciences afford. I catch the hum
Of busy thought, that rises from the many
Hives of scientific lore, spread through the land,
And watch the earnest workers come and go,
Busily laden with delights fresh culled
From truth's sweet opening flowers;
And I reflect that *truth is one*.
The universal scientist I see,
The love of lowly, natural truth
Joined with the truths of spirit and of life.
As the dear Christ had set in the vain midst
Of aged superstitions,
A wondering child-love of the simple truth,
A clear-eyed vision of his lovely world,
And plainly said, "Of such the kingdom is;"
For all is safety in the love of truth,
Which cleanses from all guile.
Like a great mountain stream, that takes its rise
Far above all, and flowing down
In its resistless might, washes the lowest vale,
Even so the baptism of the Spirit of Truth,
Down-streaming, purifies the natural mind
To see the deepest things of God,
And work His utmost will.

PREFACE.

The completion of Volume III. of the Proceedings of the Davenport Academy of Natural Sciences closes the life-work of its youthful editor and publisher, Joseph Duncan Putnam. As a fitting tribute to his memory, this is made a memorial volume.

It was through his earnest efforts that the plan for the publication of its proceedings was inaugurated by the Academy in November, 1875. The first volume was issued in 1876, under his editorial management. The publication of Volume II. was his individual enterprise. It was received with favor by the scientific world, and brought large additions to our library and museum. The first part of Volume III. was published by the Academy, and contains the proceedings of the annual meeting of January 1st, 1879, with a list of exchanges and donations during the years 1877 and 1878. To secure the continuation of this publication, Mr. Putnam, on January 18th, 1881, removed to the Academy building his private press and printing material, and made, at his own expense, such additions of type and material as were found to be necessary for the work. The entire editorial supervision, until his death, was performed by Mr. Putnam, and, under this economical arrangement, the printing of the second part of this volume steadily proceeded. It contained the proceedings and scientific papers presented during the years 1879, 1880, and 1881.

The labors thereon of the young publisher were closed at page 128 by his untimely death, December 10th, 1881. At this point the unfinished work of Mr. Putnam was taken up by his associates and friends, and Part II. of this volume was completed and issued in August, 1882.

The Table of Contents indicates the general character of the contributions during this period. They were largely made up of local investigations into the natural history, antiquities, and geology of this district. Other papers, from abroad, occupy the larger field of investigations opened by our rapidly-developing western territories.

The third and concluding part of Volume III., published by the Academy, is also issued as a separate publication, and is exclusively devoted to the memory of its late President, Joseph Duncan Putnam.

The papers on the Solpugidæ therein contained represent the scattered notes which Mr. Putnam had been collecting for the purpose of preparing a complete monograph and bibliography of this group. They embrace the accumulations of a number of years of study and research in this line, and it is greatly to be lamented that he could not himself have brought the material together in shape for publication. These notes have been collected, prepared, and arranged for publication with conscientious care by Professor Herbert Osborn, Entomologist of the Agricultural College, at Ames, Iowa.

with a view of presenting them in the best form for use in the scientific world, and with no attempt to complete unfinished work. The Bibliography has been carefully completed by Miss Julia E. Sanders, of Davenport, Iowa, by laborious compilations from Mr. Putnam's voluminous notes and extracts. Mr. Osborn and Miss Sanders have also kindly attended to the proof-reading in the publication of these papers.

The paper of Mr. Putnam on Solpugidæ is illustrated by four plates, prepared from his own original drawings of the insect. The engravings were made by Mr. A. Meisel, the eminent engraver of Boston. This work was kindly superintended by Dr. H. A. Hagen, of Cambridge.

The steel-plate engraving of Mr. Putnam was obtained and presented by his parents. It is the work of Mr. G. R. Hall, of Brooklyn, N. Y., and is considered an excellent likeness.

The wood-cuts on pages 86, 87, 106, and 128, illustrating papers of Professor Berthoud and Professor Pratt, were executed by Mr. Putnam himself. The four plates used in illustrating the paper of W. J. Hoffman on Mexican antiquities, were kindly furnished by the Smithsonian Institution.

The names of the subscribers to this publication will be found at the end of the volume.

DAVENPORT, February 22, 1883.

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REPORTS ON THE CONDITION AND PROGRESS
OF THE
DAVENPORT
ACADEMY OF NATURAL SCIENCES,
DURING THE YEAR 1878:

BEING THE PROCEEDINGS OF THE ANNUAL MEETING,

Held Wednesday, January 1st, 1879.

JANUARY 1ST, 1879.—ANNUAL MEETING.

Dr. R. J. Farquharson, President, in the chair.

Twenty members present.

The reports of the officers and standing committees were presented and read.

Annual Address of the President.

LADIES AND GENTLEMEN:—Another year, the eleventh, has been added to the short life of our Academy, and though not yet in its teens, it may, thanks to a marvelous growth, be said to have already reached the stage of adolescence. We earnestly hope that it may escape the short-lived fate of many precocious individuals and institutions, and we must strive hard to give it such a continuous, steady growth, that it may not be said of it hereafter, "that like the pigeon, it was biggest in the squab state." What is needed, in my opinion, to avoid either a premature death or a period of comparative stagnation, is an infusion of young blood in the shape of workers—earnest, energetic workers—to take the place of those whose advancing years and increasing infirmities may soon unfit them for the task. To the younger men of the Academy I would especially commend the study of Natural History, not as a means to command riches or fame, though a fair proportion of the latter is thus attainable, but as the best source of that happiness for which all men strive: for I can truthfully say of this study, that the only truly happy men I have ever known were naturalists, men removed from and apparently above the petty cares and vexations of this world.

The constitution devolves on me the duty of making a report on "*The condition and progress of the Academy in all its departments.*" This report will necessarily consist, in a great measure, of a condensed summary of the reports of the various officers, as follows, viz :

The RECORDING SECRETARY, Mr. Charles E. Harrison, reports, that during the year there were held ten regular meetings of the Academy, with a mean attendance of eighteen members ; one special meeting, with an actual attendance of thirty-nine; four regular and nine special meetings of the Trustees, with a mean attendance of ten. He also reports that lectures were given by Professors Gregory, Butler, Hailman and Parvin, and that papers were read by the following gentlemen, viz : W. W. Calkins, A. D. Churchill, C. E. Harrison, J. Gass, W. H. Barris, J. D. Putnam, W. H. Pratt, R. J. Farquharson and H. Strecker. He also reports the election of sixteen persons as regular members, and twenty-seven persons as corresponding members. Thirty-four names have been dropped from the roll, leaving the present number of regular members 188, of whom fifty-three are life members. There are also 210 corresponding and six honorary members.

Of the great labors of our indefatigable CORRESPONDING SECRETARY, I must allow his own report to speak, contenting myself with the mere mention of the fact that during the year 700 letters were received and 427 written. During the year the first part of Volume II of the Proceedings of the Academy, was sent to all institutions which had in any way acknowledged the receipt of the first volume. The number of copies thus disposed of was 239, which, with eight copies missing, leaves 275 copies on hand at this date. Of the first volume of the Proceedings, eighteen copies were given in exchange, and nineteen copies lost while moving into the new building, leaving 205 copies now on hand.

The reports of the TREASURER and of the FINANCE COMMITTEE will speak for themselves. The financial condition of the Academy is quite as favorable as we could expect, considering the great depression of business during the past year.

The report of the CURATOR, Mr. W. H. Pratt, presents a statement of the condition of the Museum, which need not be quoted here ; it will suffice, to state in a general way that the Museum has had numerous additions in its various departments, some of them of almost priceless value in a scientific point of view, notably in the Archaeological Department, the last tablet and two animal pipes, for which we are again indebted to the kindness of that indefatigable explorer, the Rev. J. Gass.

BOTANY.

Dr. C. C. Parry reports the following additions to the botanical collection during the past year : A large collection of plants, mainly of the Eastern States, from G. W. Tryon, of Philadelphia, through Prof. D. S. Sheldon, with additions of western and southern plants, making not less than 1,500 species ; a collection of Algae from the coast of Ireland, from

D. Swiney, Esq.; a miscellaneous lot of western and southern plants from W. W. Calkins, of Chicago; and lastly, the deposit of the C. C. Parry Herbarium, numbering not less than 15,000 species, rendering the botanical collections of the Academy nearly complete for Western American plants.

ENTOMOLOGY.

In this department Mr. J. D. Putnam reports: February 21st, the deposit of his collection, estimated to contain about 8,000 species and 25,000 specimens, of which the *Colcoptera*, *Lepidoptera*, *Hymenoptera* and *Orthoptera* are named and labeled. The additions during the year are: From Hy. Edwards, San Francisco, 560 specimens of 323 species of insects all orders, from California and Australia; from G. W. Belbrage, Clifton, Tex., 449 specimens of 246 species of Texas *Colcoptera* and *Lepidoptera*; from C. C. Parry, a collection of Mexican *Arachnida*; from Chas. Crampton, Moline, Ills., a collection of spiders; single specimens of insects from many others; a small collection made by J. D. Putnam at Mackinac and Lake Superior in August, 1878.

In concluding the subject of the Museum, I might say, without incurring the reputation of boasting, that it is very strong and full in the following departments, viz: American Archaeology, Botany, Entomology and Conchology.

LIBRARY.

During the unavoidable absence of the Librarian, Mr. J. G. Haupt, Mr. J. D. Putnam has kindly acted in his place, and reports the following additions: of complete volumes, 290; of incomplete volumes, 63; and of pamphlets, 539, making a total increase of 912 books. Nearly, if not quite all, of these books were in exchange for the published Proceedings of the Academy. They came as follows, viz: from 80 individuals, from 100 institutions in the United States, from 81 foreign institutions, from 23 different States and Territories in the United States, and from the following foreign countries: Russia, Belgium, Austria, Holland, Italy, Germany, Switzerland, France, Algeria, Denmark, England, Ireland, Scotland, Venezuela, Mexico, Brazil, Argentine Republic, Canada, Mauritius, Tasmania, New Zealand, Victoria and South Australia.

PUBLICATION OF PROCEEDINGS.

I would beg leave to call particular attention to the report of the COMMITTEE ON PUBLICATION, the statements and arguments in which in regard to the prime importance, the necessity of continuing the publication of our Proceedings, I most heartily endorse.

SECTIONS.

During the year many meetings of the Biological, the Geological and Archaeological, and the Historical Sections, have been held. The average attendance of the two first has been small, but some papers have been read and some good work done; in the latter the average attendance has been quite good and much interest taken, especially in the

collection and preservation of relics and old documents, illustrative of the early history of this section of country.

In conclusion, I would beg leave to make a few remarks upon archaeology, suggested by our recent acquisitions in that branch of science, especially the last tablet and the animal effigy pipes. In regard to the tablets, descriptions and photographs have been submitted to the examination of the leading archaeologists, both in this country and in Europe. What the former thought of them you have been already told; of the latter you have seen a very favorable opinion expressed by the International Congress of Americanists, at their last meeting, held at Luxemburg in 1877, a translation of which was published in the *Gazette* of this city.

If there are now any doubters of the authenticity of "these precious monuments," as Mr. Lucien Adams is pleased to call them, they are silent, either from their doubts having been dispelled by the accumulation of material evidence, or it may be that they deem us so incorrigible in the continued fabrication of these relics, that remonstrance would be wasted on us.

No one, as yet, has suggested any reading or solution of the letters or hieroglyphics, which are also repeated, some, at least, in the last found tablet. But we need not despair. That venerable archaeologist, Mr. S. F. Haven, in speaking of these very inscriptions, says*: "These are, at present, unintelligible, but may hereafter disclose their secrets when the habits of thought and the methods of expressing and recording facts and ideas peculiar to the American races of both continents, shall be better comprehended and compared. This must be the fruit of information more accurate and general, and philosophy more profound, than has heretofore been applied to their elucidation."

Of the pipes, the bear depicted by the artist must have been the grisly, whose habitat must have been more extended then than at present, being as he is, the counterpart of the great cave bear so common in Europe in prehistoric times. In the elephant pipe we have the keystone of the arch of evidence, which has been building for so many years. Regarding this obvious effigy of the mastodon, we can echo the words of the original description of the elephant mound of Wisconsin in the Smithsonian Report for 1872, which says: "Is not the existence of such a mound good evidence of the cotemporaneous existence of the mastodon and the mound-builders;" and strange to say, both the mound and the pipe are entirely destitute of tusks.

One glance at the ever-recurring question, "Who were the mound-builders?" and I have done.

The most commonly accepted theory is that they were a kindred race to the Aztecs, and that, as the traditions of the Natchez affirm, all the valley of the Mississippi was peopled by a race of sun worshippers like themselves. But this was a comparatively recent event. There

*Proceedings of the American Antiquarian Society, No. 71, p. 18.

was a race more advanced than the Natchez, at least more expert in mining, who preceded them, and must have occupied the country for ages, as the following facts will show :

A recent writer (Jacob Houghton) states that a single district of Isle Royal, of eighteen square miles extent, had produced for these ancient miners more copper than the total production of richest modern mines of Lake Superior for the space of twenty years. He also says that this region supplied not only this country, but Mexico, the Antilles, Yucatan, Central America, and probably even South America. In this opinion, at least in regard to Mexico, Baron Hellwald concurred when he said* : "There does not exist any trace of the working of any mine of copper in Mexico by the natives prior to the discovery of America." This immense traffic in copper must have preceded both the recent Indians, and the Natchez and their kindred.

Another theory, just coming into vogue, is that of Rink, a learned Dane, who has spent many years among the Esquimaux, and is quite familiar with their language and traditions. He says that the Esquimaux, as we know them, are an expiring race ; that they did not always live by the sea shore and on the products of the seal fishery ; that they once had other habits of life, and were forced to migrate northward, having at one time occupied the most of this continent.

Of this old race our oldest mound builders may have been a part (for I hold that there were two, if not three, races before the present Indians). The points in favor of this supposition are—first, the similarity in the shape of the crania between the Esquimaux and the old mound builders ; second, both people worshipped the sun and moon ; third, both were expert carvers in stone, bone, etc. ; fourth, tradition among the Esquimaux point to a time when they had a way of recording their history. A Catholic Missionary (Rev. Eugene Vetromill) once told Mr. Haven that the Indians of Nova Scotia employed "a series of characters, standing not for ideas but words."† This, it is likely, they must have borrowed from the Esquimaux, as no modern Indians have been known to have had the like. Again we have good reason for supposing that our mound builders had a written language. Fifth, and lastly, Houghton says that the ancient miners of Lake Superior must have been there soon after the retrogradation of the glaciers, or they never would have discovered the mines of native copper as they did.

*Compte Rendu du Congress Americanists, 2d sess. 1877, Vol. I, p. 51.

†Proceedings American Antiquarian Society, No. 70, p. 95.

Curator's Report.

Mr. President and Members of the Academy :

Soon after my last annual report, the Museum was removed to the new building, the cabinet cases being transferred without the addition of any new ones. Since that time the collection has been constantly and rapidly increasing, while our finances did not seem to warrant the very desirable extension of shelf room for its reception. The consequence is that much of what has been received has necessarily remained unpacked, or laid aside until we should be better prepared for the proper disposition of it.

Within a few days a fine case of forty large drawers has been constructed in the basement, which very much facilitates the better care and arrangement of the numerous specimens for which there is, as yet, no room in cases, as well as the duplicates which are kept for purpose of exchange.

Even this work, though now in progress, is as yet but partially performed. As it is contemplated very soon to put up eight new cases for the Museum and Library, it is confidently hoped that we shall soon find suitable space for many specimens, and some considerable collections which have long been awaiting presentation to the public view.

Owing to the circumstances already mentioned, I am still unable to present catalogues of the collections, or to enumerate in this report the precise number of specimens in each department which have been received during the year.

IN ARCHÆOLOGY.

Several mounds have been explored, and also a number of Indian burying grounds in this vicinity, by our associate, Rev. J. Gass, and other members. In order to pursue this highly important work to a greater extent and to better advantage during the coming year, it seems very desirable, if possible, to adopt some efficient plan to establish a fund to defray the expenses of such explorations.

The most important and valuable article of any kind which has come into our possession during the past year, is undoubtedly another ancient inscribed tablet, this time of stone, and bearing, with the very interesting figures which differ from those on the other tablets, a number of hieroglyphic characters identical with those, and also unmistakable representations of several of the relics peculiar to the mound-builders.

We have received, chiefly through Capt. Hall, the following articles, viz : About 35 vessels of ancient pottery from different localities—about half of which were broken and have been more or less imperfectly restored—and numerous fragments ; 2 mound builders' pipes ; about 4550 flint implements ; about 75 stone implements ; 1 relic of hammered copper ; a number of ornaments or charms, made of the teeth of the bear, elk, etc ; several casts of ancient stone implements, and a few skulls from the mounds.

IN GEOLOGY AND PALEONTOLOGY.

Valuable researches have been made and specimens collected by Prof.

Barris, who has also contributed important papers on those subjects, and very considerable contributions have been made by several other parties, as is shown by the list of donations.

IN NATURAL HISTORY.

We have received some very desirable acquisitions of birds, etc., from Mrs. Sanders, Mrs. Putnam, and others; and several hundred species of marine, fresh water and land shells, and some fine corals and other marine specimens from several contributors.

In local species, most important of all, we have a very complete collection in the department of conchology; and the very extensive entomological and botanical collections of Mr. Putnam and Dr. Parry, which have been placed here, add very much to the interest and usefulness of the Museum.

Of the birds, fishes and reptiles of this locality, the collection is exceedingly limited and certainly demands prompt attention to make it what it should be. It is to be hoped that another year will not be allowed to pass, leaving this very important work still undone.

The following is an approximate statement of the contents of the Museum at this date:

Archæology.—From the Mounds—Copper axes, 22; copper knives, 3; copper awls, 14; copper beads, 385; carved stone pipes, 20; ornaments or charms of shell, bone, horn and teeth, 30; shell drinking vessels, 3; shell and pearl beads, several hundred; shell money, 150; mound build-

In the Report on the Museum, page 7, under *Archæology*, the following very important articles were inadvertently omitted, viz: The three inscribed tablets of bituminous shale from Mound No. 3, and the inscribed limestone tablet from Mound No. 10 of the Cook Farm group; the inscribed stones from Cleona, and the small animal figure from Mound No. 3; all of which are described in Vol. II of these Proceedings.

Entomology.—Mr. Putnam's collection of insects, about 8000 species.

Botany.—Plants, arranged and labeled—chiefly Dr. Parry's collection—15,000 species.

Historical and antique relics, curiosities, etc., 200.

Coins, mostly copper, about 400.

Respectfully submitted.

W. H. PRATT, *Curator*.

January 1, 1879.

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We have received some very desirable acquisitions of birds, etc., from Mrs. Sanders, Mrs. Putnam, and others; and several hundred species of marine, fresh water and land shells, and some fine corals and other marine specimens from several contributors.

In local species, most important of all, we have a very complete collection in the department of conchology; and the very extensive entomological and botanical collections of Mr. Putnam and Dr. Parry, which have been placed here, add very much to the interest and usefulness of the Museum.

Of the birds, fishes and reptiles of this locality, the collection is exceedingly limited and certainly demands prompt attention to make it what it should be. It is to be hoped that another year will not be allowed to pass, leaving this very important work still undone.

The following is an approximate statement of the contents of the Museum at this date:

Archæology.—From the Mounds—Copper axes, 22; copper knives, 3; copper awls, 14; copper beads, 285; carved stone pipes, 20; ornaments or charms of shell, bone, horn and teeth, 30; shell drinking vessels, 3; shell and pearl beads, several hundred; shell money, 150; mound builders' skulls, 28. Articles not from the Mounds.—Flint implements, 7500; stone implements, 800; hematite implements, 28; skulls, mostly Indian, 29; casts of ancient implements and relics, 8; Indian pipes, bows and arrows, 20.

Geology and Palæontology.—Silurian fossils, 115 species; devonian fossils, 145 species; carboniferous fossils, 150 species; cretaceous fossils, 30 species.

Mineralogy.—About 300 species of minerals named, and a fine collection of quartz crystals.

Zoology and Natural History.—Mammals, mounted, 13 species; birds, mounted, 90 specimens; bird skins, unmounted, 50 specimens; birds' eggs, 40 species; skulls of animals and birds, 42 species; land and fresh water shells, 400 species; marine shells, 500 species; marine corals, sponges, crabs, etc., 50 species.

Entomology.—Mr. Putnam's collection of insects, about 8000 species.

Botany.—Plants, arranged and labeled—chiefly Dr. Parry's collection—15,000 species.

Historical and antique relics, curiosities, etc., 200.

Coins, mostly copper, about 400.

Respectfully submitted.

W. H. PRATT, *Curator*.

January 1, 1879.

Report of the Treasurer.

To the Davenport Academy of Natural Sciences:

Your Treasurer respectfully presents this, the report of his accounts for the year 1878, hoping the same may meet with your approval.

The accounts of Dr. M. B. Cochran, ex-Treasurer, for the month of January, 1878, are included herein.

GENERAL FUND.

<i>Receipts.</i>	
Balance received from ex-Treasurer.....	\$ 14 69
Error in account with Dr. Burtis.....	50
Initiation fees.....	99 00
Dues for 1876.....	17 00
Dues for 1877.....	82 00
Dues for 1878.....	173 00
Received from Art Association for janitor.....	35 00
Received from Scott County Medical Society for use of rooms.....	9 00
Received from Prof. Hailman for use of room.....	6 00
Received from Chairman of Finance Committee balance from borrowed money.....	166 60
Donations for grading.....	18 00
Total.....	\$620 79

<i>Expenditures.</i>	
Janitor.....	\$142 25
Gas.....	47 95
Coal.....	54 15
Freight and express.....	42 53
Grading Fund, paid to Chairman of Grading Committee.....	18 00
Rent of old rooms.....	72 92
Insurance.....	52 50
Commission on collections.....	15 70
Extra services and investigations.....	89 50
Materials and sundries.....	41 15
Total.....	\$576 65
General Fund balance.....	44 14
Paid to Endowment Fund.....	24 69
Total balance.....	\$ 19 45

ENDOWMENT FUND.

Received from M. B. Cochran, ex- Treasurer.....	\$ 25 17
Received from John Hume, Treasurer Opening Committee.....	36
Received from Capt. T. J. Robinson, life-membership fee.....	50 00
Received from A. J. Lerch & Bro., do- nation.....	5 00
Received from General Fund.....	24 69
Total.....	\$105 22

Paid E. Baker on order.....	\$ 25 00
Paid A. J. Lerch on order.....	31 75
Paid Walter Hender on order.....	13 72
Paid John Rowe on order.....	34 75

Total.....\$105 22

LIABILITIES AND ASSETS.

<i>Unpaid Orders.</i>	
Gas Co., meter connection.....	\$ 3 00
H. H. Smith, coal.....	7 45
Gas, October and November.....	7 35
John Rowe.....	3 60
J. D. Putnam, express.....	12 15
J. D. Putnam, postage.....	66 41
Sewer tax.....	34 15
Total.....	\$134 11

<i>Assets on Hand.</i>	
Dues uncollected.....	\$109 00
Cash.....	19 45
Total.....	\$128 45

Respectfully submitted.

Davenport, Iowa, Jan. 1, 1879.

H. C. FULTON, *Treasurer.*

Report of Finance Committee.

To the Board of Trustees Davenport Academy of Natural Sciences:

GENTLEMEN :—It is made the duty of the Finance Committee to examine into the business affairs of the Academy, and to report the results at the annual meeting. Having made careful examination of the various accounts, your Committee would respectfully submit the following report, viz:

GENERAL FUND.

The entire receipts and expenditures on this account are as follows:

<i>Receipts.</i>		<i>Expenditures.</i>	
Cash on hand, January 2, 1878.....	\$ 14 69	Amount paid janitor.....	\$142 25
Cash from annual dues.....	268 00	Amount paid gas.....	47 95
Cash from initiation fees.....	99 00	Amount paid coal.....	54 15
Cash from Art Association.....	35 00	Amount paid freight and express.....	53 03
Cash from Medical Society.....	9 00	Amount paid rent old rooms.....	72 92
Cash from Endowment Fund.....	421 60	Amount paid insurance.....	52 54
Cash from other sources.....	6 50	Amount paid commissions.....	15 70
		Amount paid extra services, etc.....	89 50
		Amount paid sundries.....	56 65
		Amount paid publication.....	219 00
		Amount paid Endowment Fund.....	24 69
		Cash on hand.....	15 45
	<u>\$853 79</u>		<u>\$853 79</u>

The Treasurer's report shows unpaid orders on this account of \$144.11, and this while the receipts for the year have more than paid its ordinary running expenses. This was because of outstanding indebtedness existing at the commencement of the year, and which has been liquidated, as shown by Treasurer's report. To meet this there remains uncollected dues to the amount of \$111. making with the \$15.45, cash on hand, an aggregate of \$125.45, and leaving only a small deficiency.

ENDOWMENT FUND.

<i>Receipts.</i>		<i>Expenditures.</i>	
Cash from Dr. Cochran, Treasurer...\$	209 92	Amount paid E. Baker, grading.....\$	96 75
Cash from ladies' special fund.....	455 36	Amount paid F. Kirk, building.....	1,169 94
Cash from subscriptions.....	501 70	Amount paid Mrs. Newcomb.....	223 50
Cash from loans.....	1,300 00	Amount paid extra on building.....	248 64
Cash from General Fund.....	24 69	Amount paid Mrs. Fitch note.....	300 00
Cash from interest.....	10 67	Amount paid interest.....	32 24
		Amount paid to General Fund.....	421 60
		Amount paid ladies' special fund.....	67
	<u>\$2,493 34</u>		<u>\$2,493 34</u>

There are several items included in this account which properly belong to the General Fund account, and to that extent the loan was for the benefit of that fund, but that part of the loan having been paid, this complication is thereby removed.

LADIES' SPECIAL FUND.

<i>Receipts.</i>		<i>Expenditures.</i>	
Cash from entertainments.....	\$873 75	Paid expenses of entertainments.....	\$185 43
Cash from subscriptions.....	48 75	Paid for grading and fencing.....	128 35
Cash from other sources.....	36 05	Paid for plastering and finishing.....	45 12
Cash from Endowment Fund.....	67	Paid for drawers for Curator.....	40 75
		Paid to Endowment Fund.....	455 36
		Balance cash on hand, Jan 1, 1879.....	104 21
	<u>\$959 22</u>		<u>\$959 22</u>

RECAPITULATION.

<i>Receipts.</i>		<i>Expenditures.</i>	
Cash on General Fund.....	\$ 432 19	Paid on account General Fund.....	\$ 813 65
Cash on Endowment Fund.....	2,013 29	Paid on account Endowment Fund..	2,071 07
Cash on Ladies' Special Fund.....	958 55	Faid on acc't Ladies' Special Fund..	399 65
		Cash on hand, Jan. 1, 1879.....	119 66
Total receipts.....	<u>\$3,404 03</u>	Total expenditures.....	<u>\$3,404 03</u>

Deducting from the amount of total receipts (\$3,404.03) the amount of money borrowed (\$1,300), and it leaves the sum of \$2,104.03 as the actual receipts from all sources during the year.

ESTIMATES FOR COMING YEAR.

<i>Expenses.</i>		<i>Receipts.</i>	
Janitor.....	\$120 00	From annual dues.....	\$325 00
Gas.....	36 00	Initiation fees.....	100 00
Coal.....	50 00		
Insurance.....	12 50		
Stationery and postage.....	30 00		
Freight and express.....	40 00		
Interest.....	150 00		
	<u>\$438 50</u>		<u>\$425 00</u>

It will thus be seen that the receipts from dues of members and initiation fees will more than provide for ordinary running expenses, and furnish nearly enough to meet the extraordinary item of interest. There are items of expense, such as amounts paid for explorations, investigations, and other extraordinary expenditures, but as these are usually provided for by subscriptions or festivals, they are not included in the above estimates. In like manner the funds are raised to carry on the publication, and hence no estimates are made therefor.

INDEBTEDNESS.

Aside from the general indebtedness above referred to, there still remains due, on account of Endowment or Building Fund, the sum of \$1,500, which is drawing ten per cent. interest. This loan was made of Mrs. P. V. Newcomb, on the simple notes of the Academy, without mortgage or other security. The Academy should be relieved from this burden at the earliest practicable moment. Doubtless this can be done by subscription. Several persons have heretofore made liberal offers to join in any such subscription which should liquidate the entire indebtedness of the Society. The depression in business has, however, been so great during the past year, it has not been deemed advisable to ask this

of our over-burdened community. The hope is entertained that this may be accomplished during the coming year. It is therefore recommended that a conditional subscription be started for this purpose at an early day, the condition being that no payments are to be made until the entire amount of our indebtedness is subscribed. That the benefits of this institution to the city are fully appreciated, has been evidenced in the past by the generous support of our citizens, and to their large and ready liberality we can therefore recommend this enterprise with entire confidence that it will be sustained.

All of which is respectfully submitted.

CHARLES E. PUTNAM,
H. C. FULTON,
WILLIAM RENWICK,

Finance Committee.

Davenport, Jan. 1, 1879.

[NOTE.—Since the preparation of the foregoing report there have been some small amounts of receipts and expenditures on the Treasurer's account, which will produce some slight variations between his balances and the amounts above stated.—C. E. P.]

Report of Publication Committee.

To the President and Members of the Academy of Natural Sciences :

GENTLEMEN :—The Publication Committee beg leave to offer the following report in reference to the publications of the Academy for the past year (1878) :

Under the favorable arrangements made with Mr. J. D. Putnam, the second part of Volume II. Proceedings D. A. N. S., has been printed up to page 288, including, besides the condensed records of meetings, etc., original papers on Archæology, Geology, Conchology, Entomology and Botany, presented during the year, and bringing the Academy transactions nearly up to date. Some difficulties in the matter of engravings to illustrate the accompanying papers have delayed the final publication, which it is hoped may be completed early the present season, so as to allow the prompt distribution of second part Vol. II. It is desirable that this should include the Academy proceedings, embracing the present annual meeting, reports of officers, etc., but as the arrangements with Mr. Putnam only called for a volume of "not less than 300 pages"; all excess over this will need to be specially provided for by the Academy, which, in the satisfactory completion of Mr. Putnam's agreement, has reaped the full value of his gratuitous labors in superintending publication, proof-reading, etc.,—results apparent in the great number of valuable publications constantly received from kindred societies all over the world, as well as giving character and reputation to the Academy and the place of its location, the value of which it would be difficult to estimate. Unnecessary as it would seem, in view of what has been thus far attained, to argue on the importance of continuing the publication of Proceedings, your Committee deem it their duty to present some facts indicating a lack of appreciation by the resident members of the Academy, in remarkable contrast to the very flattering notices received elsewhere,

By reference to the subscription list it appears that out of a regular membership numbering 244 names, only thirty-eight (less than one-sixth) have subscribed anything; the total of subscriptions inside the Academy has been seventy copies, less than one-fourteenth of the published edition.

It is apparent from previous experience that if each member of the Academy would subscribe for only a single copy, the publication could be continued without difficulty, and enlarged in direct proportion to the growth of the Academy. But in view of the apparent indifference of actual members, the paramount importance of continuing the publication, on which it is safe to say the future standing and usefulness of the Academy largely depends, suggests the advisability of placing this work on an independent basis, either by securing a publication fund, procuring the necessary type, or any other means that may secure its permanence. The burden which has heretofore rested on one not the most able to bear it, and whose scientific labors might be more profitably directed in original researches, urgently calls for some definite and effectual action by all the well-wishers of the Academy.

A doubt at one time expressed that sufficient appropriate material would be available to keep up the publication to a proper scientific standard, has not been realized; on the contrary it has been found necessary to condense the papers presented in order to include them in the current volume, and some desirable communications have been deferred. The proper gauge of the scientific value of the publication thus far issued, is found in the prompt response by way of exchanges with old established kindred associations, of which the report of the Corresponding Secretary affords full details. It is not too much to say that every single volume issued brings back in return ten times its pecuniary value, besides making accessible for the first time in the history of Davenport a really desirable library of scientific reference. Furthermore, these accessions will continue in an increasing ratio, just as long as we show our vitality by keeping up the publication, which as the natural result of experience will doubtless show a steady improvement to meet the just demands of a progressive age and country.

Respectfully submitted.

C. C. PARRY,
R. J. FARQUHARSON,
J. DUNCAN PUTNAM,
W. H. PRATT,
W. H. BARRIS,

January 1, 1879.

Committee.

[The substance of the reports of the Recording and Corresponding Secretaries, and of the Librarian, having been included in the President's Address, they are here omitted.]

The reports were received and ordered filed.

The President announced the next business in order to be the election of officers for the ensuing year.

Dr. Parry then said:—

The new year is generally considered a suitable time for the settlement of old accounts, and this Academy has a long-standing debt, which perhaps it will never be in a condition to repay, but should be at least acknowledged. It is quite unnecessary to explain to any here present that the actual success and present prosperity of the Academy has been coincident with the interest taken in it by woman. It was a Woman's Centennial Association that first inaugurated and successfully carried out the publication of Proceedings, on which, more than any other one thing, the scientific character and standing of the Academy abroad has been firmly established. The very ground beneath our feet is the spontaneous gift of a generous woman, and this commodious building, which affords us a permanent home, from lowest foundation stone to highest roof-crest, if not the direct work of woman's hand, has been wrought out and completed under the inspiring influence of a woman's heart. It has been proposed, and I doubt not will meet the spontaneous approval of all present, to recognize this obligation in a very appropriate way, as well as adding a crowning glory to the institution, by electing MRS. C. E. PUTNAM President of the Academy for the ensuing year. I therefore move that the usual formal ballot be suspended, and the above nomination be acted on by acclamation and a rising vote.

The motion was carried, and Mrs. Putnam was unanimously elected.

The thanks of the Academy were voted to Dr. Farquharson for the able and efficient manner in which he has performed the duties of President during the past year.

The following officers were elected to serve during the ensuing year:

President—MRS. MARY L. D. PUTNAM.

Vice-Presidents—WM. H. PRATT, DR. C. C. PARRY.

Corresponding Secretary—J. DUNCAN PUTNAM.

Recording Secretary—CHARLES E. HARRISON.

Treasurer—H. C. FULTON.

Librarian—DR. R. J. FARQUHARSON.

Curator—WM. H. PRATT.

Trustees for three years—REV. S. S. HUNTING, WM. RIEPE, DR. E. H. HAZEN, DR. R. J. FARQUHARSON.

Adjourned to Wednesday, January 7th, 1880.

APPENDIX.

Additions to the Library during 1877.*

I. FROM INDIVIDUALS.

Austin E. P., Cambridge, Mass. On the species of *Sunius* and *Pæderus* found in the U. S. (*Austin*.) On the species of Coleoptera described by Mr. J. W. Randall (*Sprague & Austin*). Catalogue of the Coleoptera of Mt. Washington, N. H. (*Austin & LeConte*).

Baker, Dr. H. B., Lansing, Mich. Fourth Registration Report of Michigan, Vital Statistics, 1870. Fifth Registration Report of Michigan, Vital Statistics, 1871. Transactions of Michigan State Medical Society for 1876. A case of Puerperal Septic Fever (*Northrop & Baker*.) Illuminating Oils in Michigan (*Kedzie*). The Cause of Chorea (*Baker*). Address on Idiocy and the treatment of Idiots (*Wilber*); and on Heredity and Marriage (*McGraw*). Toledo Board of Health, Mortality Report for September, 1877, and History of the Board. Cerebro Spinal Meningitis (*Baker*). Meteorological Blank of Michigan State Board of Health and Ozone Scale. First published transactions of the Lansing Scientific Association, November, 1875.

Baker, Dr. J. W. H., Davenport. Fifth Annual Report of the New York State Cabinet of Natural History, 1852.

Barfoot, Prof. Jos. L., Salt Lake City, Utah. Fac-simile of the brass plates recently taken from a mound in the vicinity of Kinderhook, Pike Co., Ills., April 16th, 1843, from "Times and Seasons" and "Quincy Whig." Various Salt Lake newspapers containing matter of scientific interest.

Bassett, Homer F., Waterbury, Conn. "To American Naturalists"—a circular on collecting Galls and Gall Insects.

Butler, Prof. J. D., Madison, Wisconsin. Governmental Patronage of Knowledge (*Butler*). Prehistoric Wisconsin (*Butler*).

Calkins, W. W., Chicago, Ills. The Geological Formations of La Salle Co., and their organic remains (*Calkins*). Land and Fresh Water Shells of La Salle Co., Ill. (*Calkins*). Catalogue of Marine Collections in Natural History, Cabinet of W. W. Calkins, 1875. Catalogue of Land and Fresh Water Shells, collection of W. W. Calkins, 1874-75. Catalogue of Books, private collection of W. W. Calkins, Chicago, 1873. Condition and doings of the Boston Society of Natural History, May, 1865, May, 1866, and May, 1868, three pamphlets. Bulletin of the International Exhibition, Philadelphia, No. 2, February, 1877. Several circulars, etc.

Calvin, Prof. S., Iowa City, Iowa. Illustrations of some Devonian Fossils from Independence, Iowa, photograph.

Chambers, V. T., Covington, Ky. Papers on Tineina and Entomostracea of Colorado.

*From the records of the Corresponding Secretary.

Comstock, Prof. Theo. B., Ithaca, N. Y. Aquatic School of Natural History, Bulletin No. 2. May 12th, 1877. Brazilian Ants (*Comstock*). Yellowstone National Park (*Comstock*).

Crandall, J. A., Davenport. Finance Report, 1866. Reports of the Commissioner of Internal Revenue, 1868-71. Oration at the Commencement of Iowa College, by Rev. G. F. Magoun, July 8th, 1855. Davenport City Directory, 1870-71. Davenport City Directory, 1874-75. Map of Texas, California and Oregon, 1846. Perry's Spelling Book, Brookfield, Mass., 1820.

Crosby, W. E., Davenport, Iowa, in payment of his dues. Chemical News, 4 vols. ; 1 number missing.

Croswell, C. Mound Explorations in south-eastern Missouri (*Croswell*).

Dalrymple, Rev. Dr. E. A., Baltimore, Md. Relatio Itineris in Marylandium ; narrative of a voyage to Maryland, 1635-1637, Baltimore, February, 1874. Excerpta ex diversis Litteris Missionariorum ab anno 1638 ad annum 1677, Baltimore. January, 1877.

Dimmick, Dr. L. N., Santa Barbara, Cal. Record of Temperature at Santa Barbara, Cal., April 1, 1876, to April 1, 1877 (*Dimmick*).

Dooley, James, Davenport. Address of Hon. C. Nourse at the Centennial, September 7, 1876.

Engelmann, Dr. Geo. J., St. Louis, Mo. Two photographs of collections of Mound Builders' Pottery from Missouri.

Farlow, Prof. W. G., Boston, Mass. Botanical Papers from Bulletin of Bussey Institute, March, 1876. Notes on common diseases, caused by Fungi. On some Algæ new to the United States.

Farquharson, Dr. R. J., Davenport. Scientific American Supplement, Vols. 1, 2, 3, 1876-77. Boston Journal of Chemistry, Vols. 6, 7, 8, 9, 10.

Field, Burr K., Mt. Washington, Baltimore Co., Md. A Genealogical Sketch of the Family of Field. Johns Hopkins University, Inauguration of President Gilman, February 22, 1876. Johns Hopkins University, Second Annual Report, Baltimore, Md., 1877. Scientific Results of the Exploration of Alaska, under charge of W. H. Dall, 1865-74, Vol. I, No. 1, Dec. 1876.

Flagler, Col. D. W., Rock Island Arsenal. History of Rock Island Arsenal (*Flagler*). Report upon Ornithological Specimens collected in 1871-72-73 by Wheeler's Expedition. Catalogue of Plants, Wheeler's Expedition, 1871-72-73. Preliminary Report on Invertebrate Fossils, Wheeler's Expedition, 1871-72-73. Systematic Catalogue of the Vertebrata of the Eocene of New Mexico. Report of the Chief of Engineers U. S. A., 1876, 3 vols.

French, Chas. A., Davenport. Scientific American, 7 vols.

French, Chas., Davenport. Geology of Iowa, Hall, 2 vols.

Glover, Prof. Townsend, Washington, D. C. Manuscript Notes from my Journal : Illustrations of Hemiptera Heteroptera (*Glover*).

Haines, Mrs. Mary P., Richmond, Ind. Transactions of Indiana Horticultural Society.

Holmes, W. H., Davenport. Geological Survey of Illinois, Vol. I and

II. Ruttan on Warming and Ventilation. Farmer's Library, Vol. I. Petzholdt's Chemistry, &c. Mineral Resources of the United States, 1867 (*Brown & Taylor*).

Howgate, Capt. H. W., U. S. N., Washington, D. C. Polar Colonization and Exploration (*Howgate*), 2 pamphlets.

Hunting, Rev. S. S., Davenport. Notice of Megatherium Cuvierii. Daily Programme of American Association for the Advancement of Science, Nashville, 1877.

Le Conte, Dr. John L., Philadelphia, Pa. Methods of subduing Injurious Insects.

Lesslie, Chas. C., Davenport. Davenport City Directory, 1853. Twin Cities Directory, 1856-57. Davenport Gazette, February 27th and March 6th, 1851. Michigan State Journal, October 26th, 1854.

Love, John. Machine Guns: The Gatling Battery, The Agas and Claxton Guns, The French and Montigny Mitrailleurs (*R. J. Gatling*).

Lynch, E. P., Davenport. The Recent Origin of Man (*Southwell*).

Marsh, Prof. O. C., New Haven, Conn. Description of an Ancient Sepulchral Mound (*Marsh*). On the Odontornithes or Birds with Teeth (*Marsh*). Observations on the Metamorphoses of Sirodon into Amblystoma (*Marsh*). Structure of the Skull and Limbs in Mosasauroid Reptiles (*Marsh*). Description of Remains of a New Enaleosaurian (*Marsh*). Principal Characters of the Coryliodontidae (*Marsh*). Address as President American Association for the Advancement of Science, Nashville, 1877 (*Marsh*).

Mason, Prof. O. T., Washington, D. C. Latimer Collection of Antiquities from Porto Rico in the National Museum at Washington (*Mason*).

Meehan, Thos., Philadelphia, Pa. Mr. Darwin on the Fertilization of Flowers (*Meehan*).

Moody, J. D., Mendota, Ill. On the Rockford Tablet (*Moody*).

Miller, S. A., Cincinnati, Ohio. American Palaeozoic Fossils. Cincinnati Quarterly Journal of Science, vols. 1, 2.

Morse, Prof. Edward S., Salem, Mass. On the early stages of Terebratula septentrionalis (*Morse*). Embryology of Terebratulina (*Morse*). On the systematic position of the Brachiopoda (*Morse*). Remarks on the relations of Anomia (*Morse*). Remarks on the adaptive coloration of Mollusca (*Morse*). Description of a new species of Cyclocardia (*Morse*). The Brachiopoda, a division of Annelida (*Morse*). Position of the Brachiopoda in the Animal Kingdom (*Morse*). On a diminutive form of Buccinum undatum: a case of natural selection (*Morse*). Address by Vice-President E. S. Morse before Am. Assoc. Adv. Sci., Buffalo, August, 1876. On the early stages of an Ascidian (*Cynthia pyriformis*, Rathk.) (*Morse*). On the Tarsus and Carpus of Birds (*Morse*). On the oviducts and embryology of Terebratula (*Morse*). List of Scientific Works and Memoirs of Edward S. Morse, 1857-1876.

Moulton, M. M., Monticello, Iowa. Review of the Meteorology of Monticello, Jones Co., Iowa (*Moulton*).

Myers, Dr. R. D., Davenport. Annals of Iowa, six numbers.

Olmstead, Prof. L. G., Fort Edward, N. Y. Visit to Dr. Asa Fitch

at Fitch's Point, Washington Co., N. Y., July 5-6, 1877. Cut of beveled arrow head from Illinois.

Osten Sacken, Baron C. R., Newport, R. I. Notes on some Diptera from the Island Guadeloupe, collected by Dr. E. Palmer. On the N. A. species of the Genus *Syrphus*. Western Diptera (*Osten Sacken*).

Palmer, Dr. Edward, Cambridge, Mass. Observations on Polyzoa (*A. Hyatt*). Check List of Ferns of America north of Mexico. Remarks on some Crustacea of Pacific Coast, &c. (*Lockington*). Description of a new genus and three new species of Decapod Crustaceans (*Lockington*). Description of a new genus and three new species of Sessile Eyed Crustaceans (*Harford*). Description of seventeen new species of Crustacea (*Lockington*). American Naturalist, Vols. VIII and IX. Gould's Report on the Invertebrata of Massachusetts, 2d ed. (*Binney*). Proceedings of the American Association for the Advancement of Science, Vols. 22, 23, 24, 25. Statistics of U. S. Census, 1850. Prospectus of Birds of Florida (*C. J. Maynard*). Hymenoptera Texana (*Cresson*). Authenticated copy of last Will, &c., of George Washington, &c., 1868. Memoir of John Adams (*Wm. Church*), 1827. Lecture on Life of Dr. Franklin, &c., London, 1842. Report on Chemistry of the Earth (*T. Sterry Hunt*). U. S. Blue Book, Register of Federal Offices and Salaries, 1868-69. The Language of the Dakotah or Sioux Indians (*Roeppig*). Reports of the Commissioner of Indian Affairs, 1855 to 1872 inclusive, 18 vols. Reports of Board of Indian Commissioners, 1862, 1870, 1871, 1872. Second Annual Conference of Board of Indian Commissioners, January 15th, 1873. Report on Condition of Indian Tribes, 1867. Mineral Resources west of the Rocky Mountains, 1869 (*Raymond*). Mining Statistics west of the Rocky Mountains, 1870 (*Raymond*). Bureau of Statistics, Report on Immigration, 1869-71. U. S. Geological Survey of Colorado and New Mexico, 1869; of Wyoming, &c., 1870; of Montana, &c., 1871 (*Hayden*).

Parker, Geo. W., Liberty Township, Scott Co., Iowa. The Book of Mormon, 1830, 1st ed. (*Joseph Smith*). U. S. Register, 1837 (*Phelps & Squires*). Notes on Wisconsin Territory, 1836 (*Lieut. Albert M. Lea*).

Parry, Dr. C. C., Davenport. Contributions to the Botany of North America (*Asa Gray*). Early Exploration and Settlement of the Mississippi Valley, an historical address (*C. C. Parry*). Fourth Report of the State Cabinet of Natural History of New York, 1851. Insects Injurious to Vegetation in Illinois (*Walsh*). List of the Pseudoneuroptera of Illinois (*Walsh*). On the Genera of Aphidæ found in the United States (*Walsh*). Fire Blight; two new foes of the apple and pear (*Walsh*). The Practical Entomologist, Vol. I, No. 1. The Evolution, Vol. I, No. 1.

Perkins, Prof. Geo. H., Burlington, Vt. On certain internal parasites of Domestic Animals (*Perkins*). On certain Injurious Insects (*Perkins*). On some fragments of Pottery from Vermont (*Perkins*).

Pinart, Alphonso L., Paris, France. Dictionnaire de la Langue Déné-Dindjie, &c., par M. l'Abbe Petitot, Paris, 1874. Voyages à la cote

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BUENOS AIRES.—*Museo Publico de Buenos Ayres*. Anales, Nos. 1-7, 1864-70.*

Argentine Centennial Commission. The Argentine Republic, by Richard Knapp, Buenos Aires, 1876.*

EUROPE.

ENGLAND.

LIVERPOOL.—*Literary and Philosophical Society*. Proceedings, 1876-77, No. XXXI.

LONDON.—*Royal Society*. Proceedings, Vol. XXVI, Nos. 180-183, 1877.

LONDON.—*Zoological Society*. Proceedings, (illustrated), 1866, parts 1, 2, 3; 1867, parts 1, 2, 3; 1868, parts 1, 2; 1869, parts 1, 2; 1873, forty-six sheets (without plates).*

LONDON.—*Entomological Society*. Proceedings, 1877.

LONDON.—*The Entomologist*. Vol. XI, Nos. 176-187, 1878.

LONDON.—*The Quarterly Journal of Conchology*. Vol. I, Nos. 11-15.*

LONDON.—*Bernard Quaritch*. Book List, October, 1878.

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SCOTLAND

GLASGOW.—*Natural History Society*. Proceedings, Vol. II, parts 1, 2, 3, 1875-76; Vol. III, parts 1, 2, 3, 1876-78.

GLASGOW.—*Philosophical Society*. Proceedings, Vol. XI, No. 1, 1877-78.

*From the Smithsonian Institution.

IRELAND.

BELFAST.—*Flax Extension Association*. Instructions for the Culture and Preparation of Flax in Ireland.*

DUBLIN.—*Royal Irish Academy*. Proceedings, Vol. II, Series 2, Nos. 1, 2, 3, 1875.*

DUBLIN.—*Geological Society*. Journal, Vol. II, Parts 1, 2, 1839-40; Vol. IV, Part I, Part II, No. 2, 1851.*

DUBLIN.—*Royal Geological Society of Ireland*. Journal, Vol. XII, Part 2, 1868-69.*

FRANCE.

BORDEAUX.—*Société Linneenne*. Actes: Tomes 6-10, 21-25, 1834-38, 1858-66.*

DIJON.—*Académie des Sciences, Arts et Belles Lettres*. III série, Tome 4, 1877.

LILLE.—*Société des Sciences de l'Agriculture et des Arts*. Mémoires: Second series, Tomes 1, 3, 4, 5, 1854-58; third series, Tomes 1, 2, 4, 5, 6, 12, 13, 1869-74.*

LYON.—*Société d'Etudes Scientifiques*. Bulletin, Tome III, No. 2, Juillet, Decembre, 1877. Règlement de la Société, 1878.

PARIS.—*Académie des Sciences*. Comptes Rendus hebdomadaires, Tomes 78-83, 1874-1876.*

ALGERIA.

ALGER.—*Société des Sciences, Physiques, Naturelles et Climatologiques*. Bulletin, 1877, Nos. 2, 3, 4.

BELGIUM.

BRUXELLES.—*Société Entomologique de Belgique*. Annales, Tome XIX, 1876. Compte Rendus, Nos. 46-57, December, 1877, to November, 1878.

BRUXELLES.—*Congrès International des Americanistes*. Circulars: Troisième session, Bruxelles, du 23 au 26 Septembre, 1879.

HOLLAND.

AMSTERDAM.—*Frederick Muller & Co*. Catalogue Raisonné de 3000 Portraits, etc., 1877. Catalogue of Books, Maps, &c., on North and South America, 1877. Catalogue d'ouvrages sur les Sciences naturelles et exactes délaissée par feu MM. Ontijd et Bosquet, 1878.* Catalogue of Exhibit of the Netherland Booksellers at Philadelphia in 1876.* Prospectus of "Annals of the Royal Zoological Museum at Leyden."**

HARLEM.—*Hollandsche Maatschappij der Wetenschappen*. Archives Néerlandaises des Sciences exactes et naturelles, Tome XIII, 1, 2, 3, livraisons. Programme, Année, 1878. Historical Notice of the Dutch Society of Sciences at Harlem, 1876.*

ROTTERDAM.—*Van Hengel & Eeltjes*. Circular of "Annales Musei botanici Lugduns, Batavi (F. A. G. Miguel).

'S-GRAVENHAGE.—*Nederlandsche Entomologische Vereeniging*. Tijdschrift voor Entomologie, 21 deel, 1877-78, 1, 2, alf.

* From the Smithsonian Institution.

ITALY.

PISA.—*Università Toscana*. Annali, Tomo XI, XII, 1869-72.*

PISA.—*Società Toscana di Scienze Naturali*. Atti, Vol. III, fasc. 1, 2, 1877-78. Processi Verbali, 7 luglio, 1878.

SWITZERLAND.

BASEL.—*Benno Schuabe*. Prospectus: Albert Keim on Mechanismus der Gebirgsbildung.

BASEL.—*Naturforschenden Gesellschaft*. Verhandlungen, 6 Theil, 3, 4 Hefte, 1877-78.

LAUSENNE.—*Société Vaudoise des Sciences Naturelles*. Bulletin: 2 Serie Vol. XIII, Nos. 73, 74; Vol. XIV, Nos. 75-76, 1874-76.* Vol. XV, Nos. 78-79, September, 1877, to April, 1878.

ST. GAILLEN.—*Naturwissenschaftlichen Gesellschaft*. Bericht über die Thätigkeit, 1871-72.*

SCHAFFHAUSEN.—*Schweizerischen Entomologischen Gesellschaft*. Mittheilungen, Vol. 5, Nos. 5-6. Nov. 1877, Juni, 1878.

ZÜRICH.—*Naturforschenden Gesellschaft*. Vierteljahrsschrift, 21 und 22 Jahrganger.

AUSTRIA.

WIEN.—*Kais. Kong. Geologischen Reichsanstalt*. Jahrbuch, Band XVII, 1877, Nos. 1-4; Band XVIII, 1878, Nos. 1, 2. Verhandlungen, 1877, Nos. 1-18; 1878, Nos. 1-10.

WIEN.—*Kais. Kong. Oesterreich Museums für Kunst und Industrie*, Mittheilungen, XII Jahrg, Nr. 136, Januar, 1877.*

WIEN.—Die Plastik Wien's in diesem Jahrhundert (*Eitelberger*), 1877.*

WIEN.—Zur Frage der Erziehung der industriellen Classen in Oesterreich, 1876.*

GERMANY.

BERLIN.—*Entomologischer Verein*. Deutsche Entomologische Zeitschrift, Jahrgang XXI, 1877, heft 1-2; Jahrgang XXII, 1878, heft 1.

BERLIN.—*B. Friedländer & Sohn*. Bucher Verzeichniss, Nos. 266-290.

BONN.—*Naturhistorischen Vereines der preussischen Rheinlande und Westfalens*. Verhandlungen, 4er Jahrgang, 1te Hälfte, 1877.

DANZIG.—*Naturforschenden Gesellschaft*. Schriften, Neue Folge, 4en Bandes, 2er heft, 1877.

DRESDEN.—*Naturwissenschaftlichen Gesellschaft Isis*. Sitzungs-Berichte, Jahrgang, 1877, Nos. 1-6.

DRESDEN.—*Kaiserlich Leopoldinisch-Carolinisch-Deutschen Akademie der Naturforscher*. Leopoldina, 13er Heft, Jahrgang, 1877.

EMDEN.—*Naturforschenden Gesellschaft*. Jahresbericht, 62er, 1876.

FREIBURG I. BR.—*Naturforschenden Gesellschaft*. Berichte über die Verhandlungen, Band VII, heft 1, 1877.

*From the Smithsonian Institution.

GIESSEN.—*Oberhessischen Gesellschaft für Natur-und Heilkunde*. Berichte 15-16, 1876-1877.

GÖTTINGEN.—*K. Gesellschaft der Wissenschaften und der Georg-Augusts Universität*. Nachrichten aus dem Jahre, 1877.

HANNOVER.—*Naturhistorischen Gesellschaft*. 25er und 26er Jahresberichte, 1874-75, 1875-76.

HEIDELBERG.—*Naturhistorisch-Medicinisch Vereins*. Verhandlungen, Neue folge, 2er Band, 2er heft, 1878.

KÖNIGSBERG.—*Physikalisch-oekonomischen Gesellschaft*. Schriften, 17er Jahrgang, 1876, 1er u. 2er abtheilung; 18er Jahrgang, 1er abtheilung.

LEIPZIG.—*Museums für Volkerkunde*. Vierter Bericht, 1876.

MARBURG.—*Gesellschaft zur Beförderung der gesammten Naturwissenschaften*. Sitzungsberichte, Jahrgang, 1876, Jahrgang, 1877.

METZ.—*L'Academie de Metz*. Mémoires, LVIIe Année, 1875-76.

MÜNCHEN.—*K. Bayerischen Akademie der Wissenschaften*. Almanach für das Jahr 1878. Sitzungsberichte der mathematisch-physikalischen Classe, 1877, hefte 1, 2, 3. Die geognostische Durchforschung Bayerns, (Dr. C. W. Gumbel).

REGENSBURG.—*Zoologisch-minerologischen Vereines*. Correspondenzblatt, 30er Jahrgang, 1876.

STETTEN.—*Entomologischen Verein*. Entomologische Zeitung, 83er Jahrgang, 1877.

STRASBOURG.—*Societe des Sciences, Agriculture et Arts*. Mémoires, Tomes I, II, 1811, 1823.*

WEISBADEN.—*Nassauischen Vereins für Naturkunde* Jahrbucher, Jahrgang XXIX and XXX, 1876-77.

RUSSIA.

DORPAT.—*Naturforscher Gesellschaft*. Sitzungs-berichte, 4er Band, 3er heft, 1877.

MOSCOU.—*Societe Imperiale des Naturalistes*. Bulletin, 1877, Nos. 1, 2, 3, 4.

S. PETERBURG.—*Imperatorskoe Ruskoe Geographicheskoe Obschestvo*. Izvestiya, Tome 14e, Nos. 1, 2, 3. Otschett za 1877. Seance Pleniere Mensuelle du 11 Octobre, 1878.

ST. PETERSBOURG.—*Academie Imperiale des Sciences*. Bulletin, Tome XXIV, Nos. 3, 4, Tome XXV, Nos. 1, 2, 1877-78.

ST. PETERSBOURG.—*Jardin Imperiale de Botanique*. Trudee (Acta Horta-Petropolitani), Tomes I-IV, Tome V, fasc. 1.

DENMARK.

KJØBENHAVN.—*Kongelige Videnskabernes Selskab*. Oversigt, 1877, Nos. 1, 2, 3; 1878, No. 1.

MAURITIUS.

PORT LOUIS.—*Royal Society of Arts and Sciences of Mauritius*. Transactions, new series, Vol. IX, 1876.

* From the Smithsonian Institution.

TASMANIA.

HOBART TOWN.—*Royal Society of Tasmania*. Papers and Proceedings, and Report for 1876.

VICTORIA.

MELBOURNE.—*Royal Society of Victoria*. Transactions and Proceedings, Vol. XIV, 1878.

SOUTH AUSTRALIA.

Statistical Sketch of South Australia, 1876 (*Boothby*).*

NEW ZEALAND.

WELLINGTON.—*New Zealand Institute*. Transactions and Proceedings, Vol. X, 1877.

Contributions to the Museum during 1877.†

- Alford, N. M., *Hamburg, Ills.* Stone axe, two arrows.
 Anderson, Jesse N., *Ashburn, Mo.* Two flint implements.
 Anderson, J. G., *Montrose, Iowa.* Stone axe.
 Anderson, John, " " Two arrows.
 Anderson, J. W., *Bay, Ills.* Two flint implements.
 Anderson, N. W., " Two flint implements.
 Anderson, Mary, " Two flint implements.
 Anderson, Eidea, " Two flint implements.
 Anderson, J. C., " Flint knife.
 Ansell, John J., " A long flint spear.
 Ansell, Mrs. Nancy, " Flint implements.
 Ansell, Miss G., " Flint implements.
 Ansell, Albert G., " Flint implements.
 Ansell, John E., " Flint implements.
 Ansell, Alice May, " Flint implements.
 Andellstedt, H. A., " One stone celt.
 Archibald, M., *Davenport, Iowa.* Fossil from Grafton.
 Auer, Henry, *Nauvoo, Ills.* Two flint implements.
 Auer, Jacob, *Deer Plain, Ills.* Four flint implements.
 Auer, Julia, " " Two flint implements.
 Bach, John M., *Gilead, Ills.* Large stone axe.
 Bailey, Edna M., *Drury, Ills.* One arrow.
 Bailey, Geo. H., " Two arrows.
 Bailey, Chas. H., " Three arrows.
 Bailey, Samuel D., " Two arrows.
 Bailey, Wallace, *Ft. Dodge, Iowa.* Specimen of celestine.
 Bailey, Miss Emma, *Drury, Ills.* One discoidal stone.
 Baker, George, *Illinois City, Ills.* One arrow.

*From the Smithsonian Institution.

†From the Records of the Curator.

- Balch, F. A., *Davenport*. Limestone geodes, with calc-spar, etc.
 Balch, G., " Specimen of coal from the anthracite.
 Ball, Chas., *Hamburg, Ills.* One arrow, one round stone.
 Ball, Alice, *Pleasant Valley, Iowa.* Two flint implements.
 Ball, Mary J., *Drury, Ills.* Two flint implements.
 Ballinger, Jessie, *Pontoosuc, Ills.* One arrow.
 Balmer, Albert, *Sonora, Ills.* Ancient stone axe.
 Balmer, John, " " Three arrow heads.
 Barber, George, *Port Byron, Ills.* White flint lance and arrows.
 Barber, Mr., *Hamburg, Ills.* Ancient stone axe.
 Barfoot, Joseph L., *Salt Lake, Utah.* Stalagmite from silver mine.
 Barnes, Chas., *Bay, Ills.* One celt, three arrows.
 Barris, Prof. W. H., *Davenport.* Fossils from Rockford, Iowa, seventeen species.
 Barton, Lincoln, *Drury, Ills.* One flint spear.
 Baule, Wm., *Davenport.* Apache Indian bow.
 Beaumont, Mrs., *Illinois City, Ills.* Six Indian bows.
 Behrens, James, *San Francisco, Cal.* Californian Arachnida.
 Belfrage, G. W., *Clifton, Texas.* Texan Arachnida.
 Bell, Washington, *Natchez, Miss.* Ancient stone implement.
 Benner, Frank, *Sonora, Ills.* Three arrows.
 Bennett, Elizabeth, *Illinois City, Ills.* One flint arrow.
 Bennett, Mary L., " " One flint knife.
 Bennett, John F., *Sonora, Ills.* One stone axe.
 Biddier, Annie and Minnie, *Sonora, Ills.* Two arrows.
 Bidwell, Mrs. Porter, *McGregor, Iowa.* One flint arrow.
 Biermann, Louis, *Dallas City, Ills.* Two arrows.
 Binder, Wm., *Davenport.* Clay-iron-stone, hollow.
 Blackmon, P. S., " Zinc blende, Kansas City.
 Blackstone, James, *Bay, Ills.* Five flint arrows.
 Blackstone, Chas., " Five flint arrows.
 Blair, Mary, *Drury, Ills.* Two flint implements.
 Blakeley, W., M. D., *Montrose, Iowa.* Two arrows.
 Blauvelt, T. T., *Davenport.* Specimen of drift copper, High School hill.
 Boerstler, John, *Gilead, Ills.* Copper awl from a mound.
 Boerstler, Caroline, " Collection of flint implements.
 Bonner, Henry, *Sonora, Ills.* One arrow.
 Bonner, Miss Agnes, *Sonora, Ills.* One arrow.
 Bonner, Mrs. Mary A., " Three flint scrapers.
 Brandberry, James, *McGregor, Iowa.* One arrow; lead ore.
 Brengton, Jeremiah, *Gilead, Ills.* One stone implement.
 Bain, James, *Utica, Ills.* Twenty flint and stone implements.
 Brigham, Albert, *Illinois City, Ills.* One arrow.
 Brock, H. T., *Smith's Landing, Mo.* Vessels of ancient pottery.
 Brock, Frank, *Deer Plain, Ills.* One hematite axe; three stone axes.
 Brown, E. B., *Brussels, Ills.* One flint implement.
 Bryant, Miss Susie, *Davenport.* Marine fish in alcohol.
 Bryant, Robert, *Clarksville, Mo.* Two arrows.

- Bryant, Wm., *Clarksville, Mo.* Two arrows.
 Buechler, Joseph, *Brussels, Ills.* Small stone axe.
 Bulon, Joseph, *Bay, Ills.* Four arrows.
 Bulon, J. B., " " Two arrows.
 Bumont, Wm., *Andalusia, Ills.* Three arrow heads, broken.
 Bunker, Addie, *Montrose, Iowa.* Two flint arrows.
 Burns, Perry G., " " One arrow head.
 Burns, James, " " One arrow.
 Burns, Mrs. Nancy, " " One arrow.
 Burns, Jonathan, " " One arrow.
 Burns, Miss Sarah, " " One arrow.
 Butler, John, *Drury, Ills.* Ancient stone implement.
 Butler, Adeline, " " One arrow; two fossil shells.
 Butler, Mrs. Catherine, *Drury, Ills.* One large flint hoe.
 Calkins, W. W., *Chicago, Ills.* Land and marine shells, etc., 228 species.
 872 specimens; dried plants, 302 species.
 Calloway, Matilda A., *Brussels, Ills.* Three arrows.
 Calvin, Prof. Samuel, *Iowa City, Iowa.* Five specimens *Sp. mucronatus*.
 Cambre, Eugen, *Nauvoo, Ills.* One flint arrow.
 Cambre, Menotti, " " One flint arrow.
 Carlston, David, *Appanoose, Ills.* One flint hoe.
 Carlston, A. P., " " One discoidal stone.
 Cassidy, L. L., *Winterset, Iowa.* Small stone hatchet.
 Catlin, Milton, *Montrose, Iowa.* Flint spear.
 Catlin, Miss Mary, " " Flint scraper.
 Celam, Alice, *Alton, Ills.* Six flint implements.
 Chapman, Wm., *Savanna, Ills.* One arrow.
 Cheney, Jacob, *Bellevue, Iowa.* Stone relic; one arrow.
 Christian, James M., *Chester, Ills.* Four arrows.
 Christian, F. W., *Drury, Ills.* Two flint implements.
 Church, Samuel, *Deer Plain, Ills.* One arrow; one spear.
 Church, Chauncey E., " " One spear.
 Church, Charles C., " " Two arrows.
 Church, Clinton, " " Ten arrows.
 Clark, Chas., *Buffalo, Iowa.* Ancient stone axe.
 Clemmons, L. W., *Pleasant Valley, Iowa.* Geological specimen clay-iron-stone.
 Clifford, Capt., *Rock Island, Ills.* Two trilobites.
 Clifton, W. C., *Almont, Iowa.* Black flint arrow.
 Clougher, Mrs. T., *Davenport.* One flint spear.
 Clugston, W. P., *Hamburg, Ills.* Small stone axe.
 Cole, Vanie, *Illinois City, Ills.* Four small arrow heads.
 Cole, Huldah, *Montrose, Iowa.* One flint scraper.
 Cole, Oliver, " " One flint scraper.
 Cole, Mrs. Ida, " " One arrow.
 Cole, Frank, " " One flint scraper.
 Comley, J., " " One arrow.
 Cook, Isaac, *Cape au Gris, Mo.* One arrow; three Pentremites.

- Cooper, Franklin, *Pleasant Valley, Iowa*. Flint implements.
- Cooper, Miss Mary, *Hanover, Ills.* Ancient stone ax.
- Courtney, Ellen, *Nauvoo, Ills.* Stone implement.
- Crabtree, Anna J., *Drury, Ills.* Three flint implements.
- Crabtree, Elizabeth, " " One stone and two flint implements.
- Crabtree, Miss Margaret, *Drury, Ills.* One discoidal stone.
- Crader, Melissa E., *Hamburg, Ills.* Large hematite axe.
- Crader, Herman H., " " Two arrows.
- Craft, Wm., *Sonora, Ills.* One fossil shell.
- Cramer, Lottie, *New Boston, Ills.* Two flint implements.
- Cramer, Z. E., " " Two flint implements.
- Cramer, R. S., " " Two flint implements.
- Crandall, J. A., *Davenport*. Donated in 1876. A pair of silver mounted brass holster pistols, used in the War of the Revolution and of 1812; in the latter by Gen. Rathbone.
- Currier, Willie, *Sonora, Ills.* Ancient stone axe.
- Currier, Albert. " " Discoidal stone.
- Dalzell, James M., Mr. and Mrs., *Davenport*. Two arrows; one spear; stone axe.
- Dart, Mrs. L. E., *Rock Island*. Quartz crystal, with inclosure of a bubble in a liquid.
- Davidson, Albert, *Bellevue, Ills.* One flint arrow.
- Davidson, Louisa, " " One stone implement.
- Davidson, Lewis and Albert, *Calhoun Co., Ills.* Ancient stone implement.
- Dawson, E. H., *Illinois City, Ills.* One arrow.
- Day, Egbert & Fidler, *Davenport*. Stereoscope.
- DeMosse, Flora, *Drury, Ills.* Two flint implements.
- Dick, George, *Brussels, Ills.* Two flint arrows.
- Dick, Mary, " " Two flint arrows.
- Dillon, John, *Gilead, Ills.* Flint knife and a fossil coral.
- Dillon, Miss Kate, *Drury, Ills.* Four flint arrows.
- Dimmick, Dr. L. N., *Santa Barbara, Cal.* A Tarantula, mounted.
- Dixon, Chas. R., *Dallas City, Ills.* Discoidal stone.
- Dixon, Thos., *Deer Plain, Ills.* Two stone axes; one hematite axe; one arrow.
- Donaldson, Garrett, *Pleasant Valley, Iowa*. Indian pipe.
- Donaldson, Zellia, " " " White flint arrow head.
- Doolittle, Sarah M., *Appanoose, Ills.* Large flint hoe.
- Doolittle, Wm. G., " " One celt.
- Doolittle, Mary E., " " Ancient stone axe.
- Dove, John, *Nauvoo, Ills.* Four stone axes.
- Downs, Miss Hattie, *Davenport*. Stone axe.
- Drury, Mary, " " Three flint implements.
- Duffy, Edward, *Port Louisa, Iowa*. One flint arrow.
- Duncan, Gen. Thomas. Collection of minerals, Wisconsin.
- Duncan, Mrs. Thomas. Moss agates.
- Ellis, Elizabeth, *New Boston, Ills.* Two flint implements.

- Essley, Elisha, *New Boston, Ills.* One flint implement.
 Essley, Mary, " " Two flint implements.
 Essley, Belle, " " Two flint implements.
 Essley, Avrilla, " " One flint; one discoidal stone.
 Essler, Thos., " " Ancient stone axe.
 Essley, Anna, " " One stone implement.
 Everett, Harvey S., *Bay, Ills.* Stone implement and one arrow.
 Everett, Fannie, *Illinois City, Ills.* Two flint implements.
 Fagle, Joseph, *Brussels, Ills.* One arrow; one stone axe.
 Fangmeier, Fritz, *Davenport.* Devonian fossils.
 Farde, Dr. L. C., *Nauvoo, Ills.* One arrow.
 Farrell, M. C., *Bellevue, Iowa.* Ancient stone implement.
 Fay, John, *Deer Plain, Ills.* Ancient stone axe.
 Fay, Edward, " " Ancient stone axe.
 Feazel, Laura, *Hamburg, Ills.* One arrow.
 Ferguson, Elmira D., *Deer Plain, Ills.* One flint arrow.
 Figg, Robert, *Oquawka, Ills.* One arrow.
 Finger, Eugene, *Davenport.* Three flint implements.
 Finley, James sr., *Cassville, Wis.* Piece of pipe stone; stone axe.
 Finley, James jr., " " Large flint spear head.
 Fisher, J. B., *Davenport.* Stalactite, Dubuque.
 Flagler, Col. D. W., *Rock Island, Ills.* Large stone axe.
 Foreman, Dr. E., *Washington, D. C.* Beetle from Lake Tititaca. Peru;
 Gluvia from Mexico.*
 Forney, Chauncey F. One flint knife.
 Foster, Isaac, *Drury, Ills.* Ancient stone implement.
 Fowler, J. S., *Davenport.* Concretion from limestone, Nebraska.
 Francis, Mrs. Annie E., *Elsah, Ills.* One flint implement.
 Freeland, Felix, *Rapids City, Ills.* Ancient stone axe.
 French, Geo. H., *Davenport.* Grooved stone from shell heaps.
 French, John, *Thompson, Ills.* One arrow.
 Frizzell, Miss M. E., *Davenport.* Calc. Tufa, from Rock Island.
 Froh, Henry F., *Almont, Iowa.* Two arrows.
 Gallaher, Hugh, *Rapids City, Ills.* Ancient stone axe.
 Gardner, Wm. H., *Sonora, Ills.* Three arrows.
 Garland, Thos., *Saverton, Mo.* Two arrows; one axe.
 Garland, Caroline, " " One stone and three flint implements.
 Garland, Frank, *Sonora, Ills.* Two arrows.
 Gaspard, J. E., *Davenport.* Trilobite.
 Gass, Rev. J., " " Large fossil shell, and several archæological relics.
 Gass, Mrs. J., *Davenport.* Ancient stone axe and sea shell.
 Gass, Miss Flora, " " Fossils, shells and twisted vines.
 Geeding, Margaret, *Brussels, Ills.* Two flint implements.
 George, Mrs. Mary, *Cordova, Ills.* One black flint arrow.
 Glancy, Geo., *Copper Creek, Ills.* Two arrows; stone axe.
 Glancy, Mrs. G., " " One arrow; stone axe.
 Goddard, Edward, *Montrose, Iowa.* One flint awl.

- Graham, Arthur, *Montrose, Iowa*. One flint knife.
 Graham, Rose, " " One flint arrow.
 Graham, Larry E., " " One flint scraper.
 Graham, David, *Rapids City, Ills.* Two arrows.
 Graham, James, " " Stone bullet mould.
 Gray, Dr. W. H., *Morgan City, La.* Alligator tooth.
 Gray, Geo. B., *Deer Plain, Ills.* One hematite axe.
 Gray, John, " " Four flint implements.
 Gray, Wm., *Davenport.* Jaws of large catfish.
 Gray, Millard F., *Deer Plain, Ills.* Seven flint implements.
 Gray, Sarah E., " " Six flint implements; one hematite.
 Gray, Laura B., " " Six flint implements; one hematite.
 Greenwood, Joseph, *Alton, Ills.* Five flint implements.
 Gresham, Logan, *Hamburg, Ills.* Three arrows.
 Gresham, Abner, " " Two stone axes; one arrow.
 Gronen, W. O., *Davenport.* Fossils from Grafton limestone.
 Günther, Otto, *Worcester, Mass.* Collection of reptiles, twelve species.
 Hall, Capt. W. P., *Davenport.* Large numbers of archæological relics collected by himself, and gathered from other parties in various parts of the country.
 Hall, Henry, *Le Claire, Iowa.* Ancient stone implement.
 Hall, Clark M., *Davenport.* Ancient stone implement.
 Hall Catharine, *Ashburn, Mo.* Twelve flint arrows.
 Hall, Miss Gracie, *Davenport.* A collection of fine flint arrow heads.
 Hall, Mrs. Mahala, *Davenport.* One flint knife.
 Hall, Dr. James, " Mound builder's pipe, Calhoun Co., Ills.
 Hammer, Mary, *Sonora, Ills.* One arrow.
 Hampton, Chas., *Montrose, Iowa.* One stone two flint implements.
 Hampton, Mary, *Copper Creek, Ills.* Four flint implements.
 Hampton, Parmela, " " Three flint implements.
 Hampton, Henry, " " Two flint implements.
 Hampton, Ella, " " Five flint implements.
 Harrison, Chas. E., *Davenport.* Specimens of polished marble.
 Harrison, Geo., *Gilead, Ills.* Ancient stone axe.
 Harrell, S. W., *Brussels, Ills.* One flint knife.
 Hartley, R. P., *Elsah, Ills.* Ancient stone axe.
 Harter, Oscar, *New Boston, Ills.* Two stone axes.
 Hartley, A., " " One flint arrow.
 Hase, Mahala A., *Ashburn, Mo.* One flint awl; one arrow.
 Haskell, J. H., *Montrose, Iowa.* One flint arrow.
 Hass, James, *Burlington, Iowa.* Ancient stone axe.
 Hasson, John, *Deer Plain, Ills.* Two flint implements.
 Haupt, Isaac, *Elsah, Ills.* One flint spear.
 Haviland, Lettie, *Valley City, Iowa.* Two arrows.
 Hawthorn, Jessie, *Drury, Ills.* One flint implement.
 Hayward, Augustus, *Port Byron, Ills.* Collection of arrows.
 Hedges, Wm., *Morgan City.* Two pair deer horns.
 Herwig, Edward, *Pontoosuc, Ills.* One flint implement.

- Heschmeier, Mary, *Deer Plain, Ills.* Two flint arrows.
- Hickox, G. G., *Davenport.* Carved ornaments, soldiers' work.
- Higham, James, *Bay, Ills.* Two arrows, one spear.
- Higham, Chas., " Five arrows.
- Higham, S. P., " Stone celt.
- Higley, Martha, *Drury, Ills.* Two flint implements.
- Hobson, E. G., *Copper Creek, Ills.* Ancient stone implement
- Hoffman, Caroline, *Dallas City, Ills.* Ancient stone axe.
- Hoffman, Henry, *Dallas City, Ills.* One stone, one hematite implement,
- Hoffman, Wm., " " Large white flint spear.
- Horton, Wm., *Deer Plain, Ills.* One flint implement.
- Horton, Minerva, " " Two flint implements.
- Houghton, Sylvanus, *Montrose, Iowa.* Two arrows.
- Hubner, Hans, *Teed's Grove, Iowa.* Black flint knife.
- Hudson, Louis, *Nauvoo, Ills.* One flint arrow.
- Huggins, Wm., *Alton, Ills.* Two flint implements.
- Humphrey, Mrs. J. J., *Davenport.* Tarantula, scorpions, etc.
- Hunt, Irene, *Hanover, Ills.* One flint arrow.
- Hunting, Rev. S. S., *Davenport.* Extension table for Academy room ;
stalagmite from Mammoth Cave ; copper ores and mound pottery
from Wisconsin.
- Hurlburt, Howard A., *Hannibal, Mo.* Two arrows ; one spear.
- Iles, Dr. M. W., *Davenport.* A collection of minerals, 100 species, named
and described.
- Irvin, Sadie, *Pontoosuc, Ills.* One arrow.
- Jenkins, Mrs. Ella P., *Davenport.* Fossil coal plant.
- Jenkins, George W., " Heads of weasel and mink.
- Johns, Mary J., *Brussels, Ills.* One copper coin.
- Johnson, S. B., " " Two hematite plummets.
- Johnson, Charles, *Illinois City, Ills.* One large flint spear.
- Johnson, George, " " Six flint implements.
- Johnson, Joshua A., " " One arrow.
- Johnson, James F., *Spring Lake Villa, Utah.* Collection of fresh water
shells ; specimens of *Stenopelmatus* and other Utah insects.
- Johnson, J. P., *Hamilton, Ills.* Stone axe.
- Johnston, Mrs. Elizabeth, *Hamilton, Ills.* Flint arrow.
- Jones, J. S., *Appanoose, Ills.* One stone celt.
- Jordan, Mr. Sioux Indian paddle.
- Joy, Charles, *Bay, Ills.* Stone axe ; two arrows.
- Joy, Eliza, " Discoidal stone ; two flints.
- Joy, Mrs. Hannah, *Bay, Ills.* Two flint arrows.
- Kane, Anna, *Andalusia, Ills.* Two flint implements.
- Kaneff, Emmett, *Ft. Madison, Iowa.* Two flint implements.
- Kaneff, Clinton, *Appanoose, Ills.* Three flint arrows.
- Kauffman, J. H., *Rock Island, Ills.* Two stone axes ; one coral.
- Kay, R. M. P., *Hamburg, Ills.* One stone implement.
- Keck, Joseph, *Fairport, Iowa.* Flint implement.

- Keely, Henry, *Port Byron, Ills.* Thirty-three flint and stone implements.
- Keller, Charles, *Elsah, Ills.* One flint implement.
- Kelly, John, *Pontoosuc, Ills.* Ancient stone axe.
- Kelly, Martha, " " One round stone; one arrow.
- Keton, James, " " One celt.
- Keton, Jerry, *New Boston, Ills.* One flint implement.
- Kimball, Miss Augusta, *Nauvoo, Ills.* Three arrows.
- King, Dr. E. H., *West Liberty, Iowa.* Carved stone head.
- Kinkead, Chas. E., *Wichita, Kan.* Petrified wood, California, Texas, &c.
- Kinne, John, *Hamilton, Ills.* One flint arrow.
- Kirkpatrick, Frank, *La Grange, Mo.* Two flint arrows.
- Kirkpatrick, Freeman, " " Twelve flint arrows.
- Kirtland Society of Natural Sciences, *Cleveland, O.* Casts of stone and flint implements.
- Kissenmacher, Mr., *Davenport.* Ancient stone implement.
- Laking, John S., *Montrose, Iowa.* One flint arrow.
- Lightner, John, *Sonora, Ills.* Stone implements.
- Link, Ollie, *Montrose, Iowa.* Flint arrow.
- Little, A. C., *Appanoose, Ills.* Two stone axes.
- Loeckinatz, Henry, *Appanoose, Ills.* Fossil shark's teeth.
- Logan, James, *Pontoosuc, Ills.* Ancient stone axe.
- Lorenzen, Martin, *Davenport.* Several animal skulls.
- Louck, David, *Oquawka, Ills.* Three flint implements.
- Louck, Jessie, " " Two flint implements.
- Luce, Thomas, *Sonora, Ills.* Stone axe; hematite axe.
- Luce, Harvey, *McGregor, Iowa.* Two flint implements.
- Luce, D. G., *Sonora, Ills.* Ancient stone implement.
- Luce, Miss Charlotte, *McGregor, Iowa.* Flint arrow.
- Lynch, Philip, *Vicksburg, Miss.* Ancient stone implement.
- Maddox, W. C., *Rapids City, Ills.* Flint arrow.
- Maddox, S. A., " " Two flint arrows.
- Mandeville, Mrs. Col., *Davenport.* A large collection of 116 specimens of quartz crystals and other minerals from Arkansas.
- Manzer, Arthur, *Fort Madison, Iowa.* Three flint implements.
- Marsh, Kalm, *Alton, Ills.* One flint spear.
- Martin, J. D., *Fort Madison, Iowa.* Flint arrow.
- McBride, Louisa, *Monterey, Ills.* A fine white arrow.
- McCabe, William, *Deer Plain, Ills.* Five flint arrows.
- McCall, I., *Hanover, Ills.* Ancient stone implement.
- McCall, John M., *LeClaire, Iowa.* Flint arrow.
- McCall, David H., " " Flint arrow.
- McCandless, George, *Sonora, Ills.* Flint arrow.
- McCandless, Charles, " " Ancient stone axe.
- McCook, Rev. H. C., *Philadelphia, Pa.* *Galeodes subulata* from Wyoming.
- McGeer, Lee, *Drury, Ills.* Two flint implements.
- McIntyre, Emma, *Saverton, Mo.* Two flint implements.
- McIntyre, Hezekiah, *Hamburg, Ills.* Large stone celt.

- McIntyre, William, *Hamburg, Ills.* Flint arrow and fossil rock.
- McManus, T. P., *Harper's Ferry, Ills.* White flint arrow.
- McNeil, Geo., *Port Byron, Ills.* Two flint arrows.
- McNeil, Mrs. Caroline, *Port Byron, Ills.* Ancient stone implement.
- Meek, Dr. A., *Davenport.* Specimen of bark of big tree. and two scorpions, California.
- Miller, David, *Pleasant Valley, Iowa.* Ancient stone implements.
- Mills, Nina, *New Boston, Ills.* Ancient stone axe.
- Mills, A. C., *Nauvoo, Ills.* Ancient stone axe.
- Milton, Wm., *Rapids City, Ills.* Stone axe.
- Mitchell, Capt. Samuel, *Davenport.* Hematite plummet.
- Moffatt, Helen, *Brussels, Ills.* Flint arrow.
- Moore, James F., *Louisiana, Mo.* Three flint implements.
- Moore, E. S., *Davenport.* Minerals and petrified wood, California.
- Moran, William S., *Nauvoo, Ills.* One flint arrow.
- Morrison, Wm. S., " Flint spear.
- Morrison, Mrs. J. M., *Jacksonville, Ills.* Two specimens horse shoe crab.
- Murray, Mary, *Harper's Ferry, Ills.* Flint knife; Chinese coin.
- Nair, Joseph, *Deer Plain, Ills.* Four arrows; one stone axe.
- Nairns, Dr. Wm., *Monterey, Ills.* Two stone axes.
- Navy, Miss Margaret, *Deer Plain, Ills.* Ancient stone implement.
- Navy, Miss Mary Agnes, " " Ancient stone implement.
- Nissen, Theodore, *Rock Island, Ills.* Collection fungi and lichens, 269 species; nine flint implements.
- Noble, D. F., *New Boston, Ills.* Flint implement.
- Noble, Ora, " " Two flint implements.
- Noble, E. H., " " Ancient stone axe.
- Paemper, Paul, *Port Byron, Ills.* Flint arrow.
- Palmer, Dr. Edward. Mound pottery from Utah; fossil fishes, salt, garnets, etc.; scorpions and insects from Southern Utah.
- Parker, Joseph, *Albany, Ills.* Modern pipe, earthen.
- Parry, Dr. C. C., *Davenport.* A crab.
- Parsons, Mary, *Hamilton, Ills.* Flint arrow.
- Parvin, Prof. T. S., *Iowa City, Iowa.* Eight cabinet cases, filled with a very extensive geological and mineral collection.
- Patterson, Col., *Oquawka, Ills.* Twelve flint implements.
- Patterson, H. N., " " One flint implement.
- Peck, L. F., *Davenport.* Flint spear.
- Peck, Elizabeth, *Davenport.* Flint spear.
- Perry, Mrs. C. H., *Keokuk, Iowa.* A large and beautiful collection of geodes from Keokuk.
- Perry, Mrs. T., *Davenport.* Fossil shells in coal slate.
- Pester, E., " Ancient pitcher, cup and fork.
- Pfeiffer, John, *Montrose, Iowa.* Ancient stone axe.
- Pitzer, W. H., *Louisiana, Mo.* Flint spear.
- Platt, George W., *Davenport.* One turtle, mounted.
- Pleasantina, Bartholomew, *Bay, Ills.* Spherical concretion.
- Pleasantina, Mary A., " Two arrows; fossil shell.

- Polk, Martin, *Hamburg, Ills.* Six arrows.
- Popenhoe, Edwin A., *Topeka, Kan.* Collection of Kansas Arachnida.
- Pracy, Mary, *Deer Plain, Ills.* Flint knife.
- Pracy, Joseph, " " Flint arrow.
- Prisley, Levi, *Monterey, Ills.* Ancient stone implement.
- Puterbaugh, Miss Ella, *Hamburg, Ills.* Flint arrow.
- Putnam, Mrs. C. E., *Davenport.* Sandalwood necklace and ear rings from Mount of Olives.
- Putnam, W. C., *Davenport.* Relic of the New York fire, 1845.
- Putnam, C. M., " " A sturgeon, mounted.
- Quinn, Miss Julia, *Warrenton, Miss.* Ancient stone implement.
- Raff, Miss Mary, *Davenport.* Two fossil shells.
- Reed, Miss Arnie and Fannie, *Bellevue, Iowa.* Two arrows.
- Reed, Alexander, " " Flint awl; copper beads.
- Reed, Mrs. Amelia G., " " Stone axe.
- Reeding, Jason H., *Brussels, Ills.* Two flint implements.
- Reid, Joseph, *Hamburg, Ills.* Flint arrow.
- Reid, Dr. J. A., *Davenport.* A mounted egret.
- Reilly, Albert, *Henrietta, Tex.* *Gonyleptis* and other insects from Texas.
- Reynolds, E. P., *Rock Island, Ills.* Fossil leaves and mineral specimens from Texas.
- Rhinebold, Wm., *Nauvoo, Ills.* Ancient stone implement.
- Rhinebold, —, " " Flint arrow and coral.
- Rice, Caspar, *Grafton, Ills.* Flint spear.
- Richards, Mrs. Clark, *Davenport.* Marine shells, *Dentalium*.
- Ritchie, Wm., *Hamburg, Ills.* Flint arrow.
- Roberts, Elisha, *Andalusia, Ills.* Two flint implements.
- Roberts, Moses, " " Three flint implements.
- Roberts, Joseph " " Three flint implements.
- Roberts, Isaac, " " Four flint implements.
- Roberts, William, *Hamilton, Ills.* Flint arrow.
- Roberts, Mr. and Mrs. E., *Cassville, Wis.* Flint spear.
- Rockel, Charles, *Dallas City, Ills.* Twenty-three flint implements.
- Rockel, Conrad, " " Stone gouge.
- Rockel, William, " " Four flint implements.
- Rockel, Caroline, " " Discoidal stone; two arrows.
- Rodgers, H., *Pontoosuc, Ills.* Flint arrow.
- Rodgers, Annie, " " Flint arrow.
- Roner, S. E., *Rapids City, Ills.* Ancient stone axe.
- Ronner, Wm., *Nauvoo, Ills.* Twenty flint implements.
- Ronner, John, " " Fifteen flint and one stone implement.
- Rosa, Alexander D., *Deer Plain, Ills.* Very large flint implement.
- Rosa, John, *Hamburg, Ills.* Flint hoe.
- Rosa, Wm., " " Flint arrow.
- Rosa, Mary, " " Flint hoe.
- Rosa, James, " " Two flint arrows.
- Rosa, Ruth, " " One flint arrow.
- Rosa, Carrie, " " One flint scraper.
- Rosa, Amanda, " " Two flint arrows.

- Rosa, Elvira, *Hamburg, Ills.* One flint arrow.
- Rosa, Eveline, " " One flint arrow.
- Ruckstuhl, Paul, *Deer Plain, Ills.* Three flint implements.
- Ruckstuhl, Harry, " " Ancient stone axe.
- Rudesell, Lulu G., *Appanoose, Ills.* Four arrows.
- Rule, Robert, *Hamburg, Ills.* Three flint arrows.
- Rule, J. D., " " Two flat spears.
- Russell, Edward, *Davenport.* A living boa constrictor from Aspinwall;
also. stone axe and two human skulls from same place.
- Russell, O. H., M. D., *Dallas City, Ills.* Flint implement.
- Ruylin, John, *Hamburg, Ills.* Flint arrow.
- Ryan, James, *Davenport.* A mounted peacock.
- Sackman, Elizabeth, *Gilead, Ills.* Two flint implements.
- Sackman, Geo. L., " Ancient stone implement.
- Sackman, John, " Flint arrow.
- Sanders, Nellie M., *Eliza P. O., Ills.* Three arrows.
- Sanders, William, " Ancient stone axe.
- Schaible, Jacob O., *Port Byron, Ills.* Flint arrow.
- Schaible, Jacob O., " " Two flint arrows.
- Schaible, P. S., " " Two flint arrows.
- Schick, John W., *Carman, Ills.* Stone axe; two arrows.
- Schick, Priscilla, " " Three flint arrows.
- Schmalznied, John, *Pontoosuc, Ills.* Ancient stone axe.
- Schmidt, Louis W., *Fairport, Iowa.* Stone axe; two arrows.
- Schricker, John, *Davenport.* Fossil shells, devonian.
- Schultz, Godfrey, *Dallas City, Ills.* Twenty arrows.
- Sconce John, *Hamburg, Ills.* Flint spear.
- Sconce, Lucinda, *Hamburg, Ills.* Two flint arrows.
- Sconce, Ella, " " One flint arrow.
- Sconce, Chester, " " Two flint implements.
- Scott, W. H., *Millville, Ills.* Stone implement and flint arrows.
- Seranton, Lee, *Montrose, Iowa.* Ancient stone axe.
- Seranton, Hiram M., *Montrose, Iowa.* Two arrows.
- Shafer, L. S., *Rapids City, Ills.* Flint arrows.
- Shanley, Patrick, *Davenport.* White flint spear.
- Sheaf, Chas., *Davenport.* Pieces from ships Lawrence and Constitution.
- Sheldon, Prof. D. S., *Davenport.* Four stone celts; one axe; specimens
of uncommon local insects.
- Sheridan, John, *Nauvoo, Ills.* Two stone implements.
- Sherman, George, *Sonora, Ills.* Three arrows.
- Shoup, Henry, *Rapids City, Ills.* Flint arrow.
- Simpson, Thomas, *Nauvoo, Ills.* One flint arrow.
- Simpson, —, *Davenport.* A bat, with three young ones.
- Sines, Perry, *Pontoosuc, Ills.* Ancient stone axe.
- Sines, Thomas, " Flint spear.
- Sines, Alice, " Flint knife.
- Sines, Mrs. Sarah, " Long flint spear.
- Sines, Hiram V., " Stone axe.

- Skinner, W. H., *Montrose, Iowa*. Two arrows.
 Slade, William W., *Sonora, Ills.* Stone chisel.
 Slater, Thomas, *La Grange, Mo.* Flint arrow.
 Sleeper, Charles, *Hamburg, Ills.* One axe ; one spear.
 Slusher, Isaac, *Montrose, Iowa*. Flint implement.
 Smith, Miss Emma A., *Peoria, Ills.* *Callosamia promithia*, ♂ ♀.
 Smith, W. R., *Davenport*. Package of devonian fossils ; a gray ground squirrel.
 Smith, Mrs. Ruth, *Illinois City, Ills.* Ancient stone implement.
 Smith, Clinton, *Sonora, Ills.* Flint arrow.
 Snow, Prof. F. H., *Lawrence, Kan.* *Galeodes pallipes* and *G. subulata* from Colorado.
 Snyder, Cornelius, *Port Byron, Ills.* Ancient stone axe.
 Spaulding, Carson, *Appanoose, Ills.* Three flint arrows.
 Spaulding, Charlotte, " " One flint spear.
 Spaulding, D. D., " " Two flint arrows.
 Sprott, T. L., *Montrose, Iowa*. Flint knife.
 Starr, M., *Moline, Ills.* Fossil coal plants.
 Steiniger, Oscar, *Bellevue, Ills.* Collection of flint arrows.
 Sterling, Dr. E., *Cleveland, Ohio*. Cast of fish—*Pike*.
 Stevens, S. P., *Rockingham, Iowa*. Ancient stone axe.
 Stinson, Elizabeth, *Carman Station, Ills.* Flint spear.
 Stumpf, John, *Gilead, Ills.* Flint arrow.
 Styers, Mrs. Margaret, *Deer Plain, Ills.* Twelve flint arrows.
 Suiter, Zachary, *Le Claire, Iowa*. Two arrows ; fossil shell.
 Supple, Henry, *Pontoosuc, Ills.* Flint arrow.
 Swafford, O. G., *New Boston, Ills.* Two flint implements.
 Swafford, Melissa, " " Three flint implements.
 Swift, Thomas, *Deer Plain, Ills.* Two flint implements.
 Terry, Sarah, *Drury, Ills.* Flint arrow ; discoidal stone.
 Thannert, Louisa, *Pontoosuc, Ills.* Flint arrow.
 Thannert, Albert, " " Flint knife.
 Thomas, Elijah, *Drury, Ills.* Two flint implements.
 Timanus, Miss Fannie, *Chicago*. Fejee war club.
 Trader, Mary, *Hamburg, Ills.* Flint arrow.
 Troxell, Wm., *Drury, Ills.* Flint arrow.
 Truax, Charles, *Maquoketa, Iowa*. Orthoceras.
 Tubbs, George E., *Port Byron, Ills.* Flint arrow.
 Tull, Mrs. Mary E., *Dallas City, Ills.* One flint spear.
 Tull, J. W., " " Two flint arrows.
 Twigg, Mrs. Dr. Wm., *Illinois City, Ills.* Two flint implements.
 Urban, Frederick. Two discoidal stones.
 Urick, Philip, *Pontoosuc, Ills.* Ancient stone axe.
 Vallandingham, Anna, *Andalusia, Ills.* Two flint implements.
 Vallandingham, Emma, " " Two flint implements.
 Velie, Dr. J. W., *Chicago, Ills.* Nine species birds' eggs ; plaster cast of bird track in sandstone.
 Viele, Charles, *Evansville, Ind.* Large silver mounted show case.

- Wagoner, I. N. jr., *Hamilton, Ills.* Two flint arrows.
 Wagoner, Herbert, " " One flint arrow; two shells.
 Wagoner, George, " " Flint arrow,
 Wagoner, Emmarilla, " " Three flint arrows.
 Walker, Margaret M., *Copper Creek, Ills.* Stone axe.
 Walker, Margaret, *Pontoosuc, Ills.* Flint spear.
 Walker, John, " " Flint spear.
 Walker, Henry, " " Flint knife and stone implement.
 Walker, T. H. B., " " Flint knife.
 Wallendorf, Anna, *Brussels, Ills.* Five flint implements.
 Wanon, W. P., *Elsah, Ills.* Large stone axe.
 Ward, Mrs. Maggie, M. D., *Gilead, Ills.* Large flint spear.
 Watt, Harry, *Davenport.* Kansas grasshopper and snake rattles.
 Watts, Wm. M., *Hamburg, Ills.* Hematite axe.
 Watts, Lafayette, " " Two flint implements.
 Wettstein, Matthew, *Alton, Ills.* Flint arrow.
 Whipple, Lizzie, *Elsah, Ills.* Five flint implements.
 Wiess, Albert, *Hampton, Ills.* Flint arrow.
 Wilford, Shed, *Drury, Ills.* Two flint implements.
 Wilford, Geo. F., " " Stone axe.
 Willie, John, *Davenport.* Fossiliferous clay from a well.
 Wilkinson, B. F., *Gilead, Ills.* Flint spear.
 Willitts, Dr. Thomas, *New Boston, Ills.* Mound builders' pottery.
 Willhoft, —, *Davenport.* Fresh water fishes.
 Williams, Albert, *Nauvoo, Ills.* Stone gouge.
 Williams, Chas., " " Flint implement.
 Williams, Morris, *Fairport, Iowa.* Two flint arrows.
 Williams, Angie, " " Flint spear.
 Williams, Mrs. R. M., " " Ancient stone implement.
 Williams, R. M., " " Discoidal stone.
 Wilson, Prof. John E., *Galt, Canada* (by John Hume). Collection of Scottish ferns.
 Witherell, L. R., *Davenport.* Minerals and fossils from Kansas.
 Woodward, W. R., *Brussels, Ills.* Two flint implements.
 Woodward, H. W., " " Flint arrow.
 Woodward, E. L., " " Flint arrow.
 Woodward, B. B., *Davenport.* Stuffed gar pike.
 Woodworth, William, *Millville, Iowa.* Mastodon tooth.
 Worley, Mrs. P. H., *Davenport.* Thirteen moss agates; galena crystals.
 Wright, Frances N., *Sonora, Ills.* Stone and flint implement.
 Yost, Miss Julia, *Hampton, Ills.* Flint arrow.
 Young, Frederick E., *Montrose, Iowa.* Flint arrow.
 Zern, John, *Pontoosuc, Ills.* Stone gouge.
 Zern, George W., *Sonora, Ills.* Stone axe; flint arrow.
 Zern, Mrs. Lizzie, " " Flint arrow.

Contributions to the Museum during 1878.*

- Abbott, Dr. J. T., *Manchester, Iowa*. A box of fossils from that locality.
- Allen, M. T., *Smithville, Miss.* Ancient stone implement.
- Andell, W., *Clifton, Tenn.* Three arrows.
- Atchison, Barton F., *Millry, Ala.* Two fossil star fish.
- Atchison, Rodolph, " " Two fossil shark's teeth.
- Atwood, H. F., *Chicago, Ills.* Twenty-five microscopic slides—Diatoms, Foraminifera, Seeds, Sands, &c.
- Barris, Prof. W. H., *Davenport.* A collection of local Devonian fossils.
- Barrows, Dr. E. S., *Davenport.* Ball invitation card on silk, 1838.
- Bartlett, Frank, *Demopolis, Ala.* One arrow head.
- Bateman, Hardin, *Randolph, Tenn.* Two flint implements.
- Bare, David F., *Smithville, Miss.* Six arrows.
- Beckerstack, W. G., *Highland, Miss.* Two arrows.
- Bellfrage, G. W., *Clifton, Texas.* Lepidoptera and Coleoptera, 246 species, 449 specimens.
- Berdan, Judge Jas., *Jacksonville, Ills.* A walrus tusk, and a bowl made of the shell of a fruit of South America.
- Blattner, Charles, *Grand Tower, Ills.* Two flint arrows.
- Boatwright, John T., *Fulton, Miss.* Ancient stone axe.
- Boudinot, Frank, *Davenport.* Cone-in-cone, from Marion county.
- Boykin, W. F., *Bladen Springs, Ala.* Three flint implements.
- Broek, R. A., *Richmond, Va.* Two cocoons of *Collosamia promithia*.
- Butler, Mary J., *Bonfonca, La.* Three flint implements.
- Byrnes, Dr. R. M., *Walcott, Iowa.* A three-legged goose.
- Calkins, J. W., *Santa Barbara, Cal.* Five flints from burial mounds; also shell beads, flint awls, stone pipe.
- Calkins, W. W., *Chicago, Ills.* Collections of marine, fresh water and land shells. 273 species, 1366 specimens; Florida plants, 10 species; fossils, 129 species, 168 specimens.
- Carmichael, J. E., *Davenport.* Skull of some animal, undetermined.
- Carroll, Mary A., *Clifton, Tenn.* Discoidal stone.
- Champlin, John, *Highland, Miss.* Five arrows.
- Cheney, W. P., *Demopolis, Ala.* Four arrows.
- Clark, T. B., *Scranton, Miss.* Two specimens French slate.
- Clark, Hon. Wm. Penn, *Davenport.* A fine specimen of *Syringopora musica*, a red coral.
- Clement, P. A., *Warsaw, Ala.* One arrow; one discoidal stone.
- Coleman, W. B., *Cypress, Tenn.* Stone axe; six arrows.
- Collier, M. V., *Eastman, Miss.* Fourteen arrows.
- Collum, P. F., " " Four arrows.
- Collum, R. S., " " Three arrows.
- Comstock, G. W. R., *Brooklyn, N. Y.* Chameleon bugs from Yucatan; shells from Bermuda; stalactite from the cave at Matanzas, Cuba.
- Crampton, Charles and George, *Moline, Ills.* Large collection of local spiders.

* From the records of the Curator.

- Cousin, Anatole, *Bonfonca, La.* Three arrows, one stone chisel.
- Crandall, J. A., *Davenport.* Old bank bill, 1852, and fractional currency, first issue, five cents.
- Curry, Mrs. T. F. M., *Davenport.* An ermine (*Puturus erminea*).
- Davenport, Geo. L., *Davenport.* Original documents relating to the early history of Davenport. MSS map of Island of Rock Island.
- Davis, Marshall, *Edgington, Ills.* Specimen of Sigillaria.
- Doe, Geo. W., *Maquoketa, Iowa.* Fine mineral specimens from Colorado.
- Drexel, Theodore, *Davenport.* Three coins.
- Dulaney, Gilbert, *Fulton, Miss.* Two arrows.
- Dulaney, W., " " Two arrows.
- Dulaney, John, " " Four arrows.
- Dulaney, Albert, " " Five arrows.
- Duvall, C., " " Six arrows.
- Dykes, J. T., " " Discoidal stone.
- Edwards, Henry, *San Francisco, Cal.* A collection of marine shells and crustacea. Californian and Australian insects, 323 species.
- Farley, F. D., *Davenport.* Fore-leg of small deer of South Sea Islands.
- Fitch, Geo. W., *Rochester, N. Y.* American cent, 1818.
- Flagler, Col. D. W., *Rock Island.* Corner Stone for Academy building.
- Foreman, Dr. E., *Washington, D. C.* A large collection of minerals, 130 species; a collection of marine shells; cast of the Mexican calendar stone, and casts of ancient stone implements, etc.
- Frahm, Henry, *Davenport.* A large collection of minerals, agates, crystals, ores and relics.
- Funderberg, N., *Eastman, Miss.* Two arrows.
- Furst, Jacob, *Andalusia, Ills.* Mineral specimens.
- Gallimore, Joseph, *Highland, Miss.* An ancient earthen vessel from the mounds; one stone axe; five flint implements.
- Garrett, W. R., *Fulton, Miss.* Three arrows.
- Gass, Miss Flora, *Davenport.* The three inscribed tablets of bituminous shale, found by Rev. J. Gass in Mound No. 3, Cook Farm Group, January 11, 1877. Also the inscribed limestone tablet found in Mound No. 11, same group, Jan. 30th, 1878.
- Gass, Miss Emma, *Davenport.* Carved animal figure from Mound No. 3.
- Gass, Rev. J., *Davenport.* A carved stone pipe, representing a bear, exhumed from a mound near Fairport, Iowa.
- Glynn, John, *Moline, Ills.* Petrified nuts, Trinity River, Texas.
- Graham, John, *Davenport.* Sutler's check, Fort Adams, fifty cents; specimens of insects and spiders.
- Grapengeter, Fritz, *Davenport.* Carved marble plate from Australia.
- Gregory, Mrs. Eva, *Utica, Ills.* Flint implements from "Starved Rock."
- Grenstein & Stravinsky, *Peter's Landing, Tenn.* Five arrows.
- Groom, J. W., *Mobile, Ala.* Brown stone plummet.
- Gunther, O. R., *Worcester, Mass.* A piece of the Great Elm, Boston Common.
- Haines, Mrs. Mary P., *Richmond, Ind.* Niagara fossils: also casts and photographs of several species.

- Haines, John T., *Aberdeen, Miss.* Five flint implements.
- Hall, Capt. W. P., *Davenport.* A large collection of stone and flint implements, pottery, fossils, etc., collected in the Southern States.
- Hall, Miss Gracie, *Davenport.* Two flint implements; one vessel ancient pottery; a collection of fine arrow heads of jasper from Mississippi.
- Hall, Mrs. Mahala, *Davenport.* Very large specimen of Fungus.
- Hallmark, J. C., *Belmont, Miss.* Four arrows.
- Harder, Wm. H., *Peter's Landing, Tenn.* Five flint arrows.
- Harrison, Gardner, *Long View, Texas.* A large centipede.
- Harrison, I. W., *Davenport.* Specimens of petrified wood, etc.
- Harrison, Charles E., *Davenport.* Polished specimen of colored coral.
- Hartwell, L. P., *Blue Grass, Iowa.* Specimen of cone-in-cone.
- Hastings, Frank H., *Davenport.* Ancient silver mounted shoe buckle.
- Hill, J. W., *Highland, Miss.* Stone axe; five arrows.
- Hirschl, A. J., *Davenport.* Large number of old local newspapers.
- Hooper, W. P., *Huntsville, Ala.* Five arrows.
- Howe, Mrs. H. J., *Marshalltown, Iowa.* Specimens of building stone.
- Hume, John, *Davenport.* A collection of flint implements, forwarded from the South by Capt. W. P. Hall.
- Hunting, Mrs. J. M., *Davenport.* Blind fishes, Mammoth Cave.
- Hutchison, P. A., *Cedar Creek, Tenn.* Ancient flint implement.
- Jackson, G. S., *Highland, Miss.* Four arrows.
- Jefferson, N. D., *Uvalde, Texas* (by Samuel Bowman, Andalusia). Specimen of *Thelyphonus giganteus*.
- Jones, John F., *Davenport.* One flint knife.
- Jones, R. T., *Fulton, Miss.* Two flint implements.
- Jones, W. F., *Eastman, Miss.* Four flint implements.
- Julien, Edwin, *Orville, Ala.* Three arrows.
- Kimball, John, *Eastman, Miss.* Fourteen arrows.
- Kircher, Mrs. Otto, *Davenport.* Eighteen coins.
- Kulp, Slidell, *Clifton, Tenn.* Two ancient stone implements.
- Lambach, Henry, *Davenport.* Pen and Ink sketch of Fort Armstrong in 1855.
- LeClaire, Antoine J., *Davenport.* A very old writing desk, with over a thousand old MSS papers, formerly belonging to the late Antoine LeClaire, the first settler of the city of Davenport in 1836.
- Lerchen, Hermann, *Davenport.* Crystals and ores from Colorado.
- Lindsay, J. B., *Davenport.* A large spider (*Lycosa*).
- Long, Mrs. E. F., *Jacksonville, Ills.* A collection of curiosities and marine shells from Panama.
- Manwell, Rev. A. C., *Davenport.* Fossil corals, Buchanan county.
- McCain, J. L., *Fulton, Miss.* Three arrows.
- McDougall, Alex., *Steamer City of Duluth.* Native copper from Ridge Mine, Ontonagon Co., Mich.
- McDowell, T. S., *Davenport, Iowa.* Mineral specimen, stalactite, worked.
- McGinty, Charles, *Derby, Ind.* Two flint arrows.
- McMahon, R. G., *Gainesville, Ala.* Four arrows.
- McPike, Jas., *Grand Tower, Ills.* One stone and two flint implements.

- Mead, Theodore L., *New York*. Several moths from California, etc.
- Means, James, *Davenport, Iowa*. A piece of walrus skin.
- Merriman, Mrs. Mary M., *Jackson, Mich.* A sea horse (*Hippocampus*).
- Miller, Mrs. Elizabeth, *Davenport*. A specimen of conglomerate.
- Mitchell, D., *Highland, Miss.* Three arrows.
- Moore, J. W., *Nelson, Neb.* Fragments of ancient pottery.
- Morrison, Hon. J. L., *Jacksonville, Ills.* Eight specimens of marble from the State House at Springfield, Ills.
- Milligan, Mrs. J. M., *Jacksonville, Ills.* A collection of fossils from Tennessee, thirteen species, fifty-four specimens.
- Miner, Noyes B., *Davenport*. Living *Saracenia* from Mackinac, Mich.
- Nelson, Jesse N., *Eastman, Miss.* One flint arrow.
- Newcomb, Mrs. P. V., *Davenport*. Life size portraits of herself and her late husband.
- Nicholson, Guillermo D., *Saltillo, Mexico*. Two specimens of Vinigrillo.
- Noe, Marsh, *Davenport, Iowa*. Ancient stone axe.
- Nunlee, Robert, *Peter's Landing, Tenn.* Stone axe.
- Parry, Dr. C. C., *Davenport*. Two circular stone plates and a slatestone implement, found by Capt. W. P. Hall; pottery whistle from Mexico; collection of Solpugidæ and insects from San Luis Potosi, Mexico; his Herbarium on deposit.
- Pickering, Miss H. E., *Davenport*. Specimens of old English crockery.
- Plath, Edward, " A golden pheasant, mounted.
- Playter, Chas. H., " Two canes from Europe and Java.
- Pollard, E., " Specimen of etching on glass.
- Price, R. S., " Twenty-one copper coins.
- Pratt, W. H., " A number of local insects.
- Putnam, Mrs. C. E., *Davenport*. A fine tortoise shell, and a large collection of bird skins from Panama; collection of copper ores and agates from Lake Superior; a vessel of ancient pottery, exhumed by Capt. Hall from a mound in Mississippi.
- Putnam, J. D., *Davenport*. Ancient pottery vessel from Mississippi; four ancient pewter dishes; his cabinet of insects on deposit.
- Rawls, L. S., *Demopolis, Ala.* Twelve quartzite and flint arrows.
- Reed, J. W., *Carmi, Ills.* One flint arrow head of twisted form.
- Riches, A. J., *Aberdeen, Miss.* One stone axe.
- Riepe, Wm., *Davenport*. A Humming-bird's nest.
- Risley, Mrs. A. M., *Davenport*. A spider; specimens of pressed ferns from New Zealand.
- Ross, W. F., *Davenport*. Fossils from Cincinnati Group, Ohio.
- Reudi, Gustav H., *St. Louis, Mo.* Three flint arrows.
- Rutherford, George, *Highland, Miss.* A small stone axe.
- Ryan, James, *Davenport*. A group of stuffed birds.
- Sanders, Mrs. M. A., *Davenport*. Mammoth tooth and bones; Indian relics; Russian sword and helmet; one stone axe; several natural history specimens; copies of English bronzes.
- Sands M., *Davenport*. An ancient jelly pot from Scotland.
- Schricker, August, *Davenport*. 500 varieties of postage stamps.

- Sheldon, Prof. D. S., *Davenport*. Several stone implements, collected in the South by Capt. Hall; a cinder from the burning of a straw stack; specimens of rare local insects.
- Shelley, James, *Davenport*. A four-legged chicken in alcohol.
- Sloss, Wm. C., *Randolph, Tenn.* Two flint implements.
- Smithsonian Institution, *Washington, D. C.* Plaster casts of the heads of four Indian chiefs.
- Stansbury, Dr. L. D., *Long View, Texas.* *Baculites ovatus*.
- Stender, J., *Davenport*. Claws of black bear.
- Stewart, Mrs. J. W., *Davenport*. Specimens of ramie and hemp. Collection of corals from Key West, Florida.
- Stibolt, Caspar, *Davenport*. A living beetle from Yucatan.
- Stiles, Frederick, *Bonfonca, La.* Two flint implements.
- Stockton, James W., *Fulton, Miss.* Two flint implements.
- Stuhr, August, *Davenport*. Numerous specimens of birds, mammals, insects and spiders.
- Swiney, D., *Ramelton, Ireland*. Collection of marine algæ from Ireland land.
- Thomas, S. J., *Cardsville, Miss.* Flint arrow.
- Thomas, Cyrus, *Carbondale, Ills.* (by Herman Strecker). Type specimens of *Caloptenus picticornis*.
- Thorington, James, *Aspinwall*. Three photographs, natives of Panama.
- Timm, Capt. Aug., *Davenport*. Agate from the Island, forty feet down.
- Toellner, Adolph, *Moline, Ills.* Two mineral specimens and an Indian skull, and American cent, 1810.
- True, Mrs. Jennie F., *Davenport*. Sword of sword-fish.
- Tryon, G. W., *Philadelphia, Pa.*, (by Prof. D. S. Sheldon.) A collection of over 1500 species of eastern plants.
- Velie, Dr. J. W., *Chicago, Ills.* Eggs of four species of birds and two of turtles; three plummets from Florida shell mounds.
- Victor, Walter, *Davenport*. Specimen of *Elaphadion parallelum*.
- Walton, Miss Alice, *Muscatine, Iowa*. Four species of *Bombycidae*.
- Waters, Joseph, *Rock Island, Ills.* Specimen of clay-iron-stone.
- Watkins, C. S., *Davenport*. Specimens of lignite and glacier ground limestone rock from bluff near Harrison street, thirty feet from surface; dendrites from the Palisades, New York; a package of minerals: geological specimen limestone from East Davenport.
- Watt, C. L., *Davenport*. A hen's egg shell of abnormal form.
- Whitfield, N., *Demopolis, Ala.* Three arrow heads.
- Whitfield, Gains, *Demopolis, Ala.* Ancient stone implement.
- Williamson, Mrs. Jane, *Cottonginport, Miss.* Discoidal stone.
- Wilson, W. H., *Utica, Ills.* Flint arrows from "Starved Rock."
- Worcester Lyceum and Natural History Society, *Worcester, Mass.* A collection of marine shells, 105 species.
- Wright, Lem., *Uniontown, Ala.* Ancient stone implement.
- Young, Mrs. J. B., *Davenport*. A copper coin, 1798.
- Young, Wm. N., *Stockton, Cal.* A cane of manzanita wood from Fossil forest, California.

Young, Mrs. D. W., *Stockton, Cal.* Specimen of cinnabar, California.

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- Barrows, Miss Sarah, *Davenport.* An old account book, Rockingham, Iowa, 1837.
- Brewster, W. C., *Davenport.* Carrier's Address, Burlington Telegraph, 1852, printed on silk.
- Pratt, W. H., *Davenport.* Rollin's Ancient History, 6 volumes; Indian wars in New England; Darwin's Botanic Garden; large collection of Genealogical and Historical books and pamphlets deposited.
- Putnam, W. C., *Davenport.* Memoirs of Shaubena (*Matson*).
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Contributions to Building Fund, 1877-78.

Mrs. P. V. Newcomb, lot on Brady St., 48 x 140 feet, valued at.....	\$4,500	B. B. Woodward.....	50
Charles E. Putnam.....	550	Capt. T. J. Robinson, Rock Island.....	\$ 50
Elliott H. Pendleton, Cincinnati.....	500	E. S. Ballard.....	25
Walker Adams.....	190	H. M. Martin.....	25
Dr. C. C. Parry.....	100	Mrs. J. M. Parker.....	25
Thompson & Bahls.....	100	M. Sands.....	25
Rev S. S. Hunting.....	100	August Steffen.....	20
Dr. E. H. Hazen.....	100	Gen Thomas Duncan.....	12
S. F. Smith.....	100	Harvey Leonard.....	10
Wm. Renwick.....	100	H. A. Runge.....	10
E. P. Lynch.....	100	F. G. Gaylord, Cincinnati.....	10
Israel Hall.....	100	Beiderbecke & Miller.....	10
Col. H. M. Mandeville.....	100	M. Boies.....	10
Students of Griswold College, through C. T. Lindley, making Prof. and Mrs. Sheldon life members.....	100	A. Burdick.....	10
W. C. Brewster.....	100	A. J. Preston.....	10
Abner Davison.....	100	Davenport Plow Company.....	10
M. S. Stuyvesant.....	50	D. Regennitter.....	10
James Renwick.....	50	Richard Smetham.....	10
Mrs. Susan B. R. Millar.....	50	J. H. C Petersen & Sons.....	10
F. H. Griggs.....	50	Mrs H. S. Winslow, Cedar Rapids.....	10
Mrs Jennie F. True.....	50	Joshua Burr.....	5
T. T. Dow.....	50	Louis A. LeClaire.....	5
Mrs. Karolin Fejervary.....	50	Chris Burmeister.....	5
		Otto Klug.....	5
		C. A. Ficke.....	5
		Dr. M. B. Cochran.....	5

Labor and Material.

T. W. McClelland & Co.....	\$100	Joseph Shields.....	\$ 12
J. S. Davis.....	75	Charles Hill.....	10
Henry Spink.....	40	M. Donahue.....	10
F. A. Balch.....	40	Renwick, Shaw & Crossett.....	8
John Rowe.....	25	Lindsay & Phelps.....	6
McCosh & Donahue.....	20	Edwin Pester.....	5
W. F. Ross.....	15	Unknown.....	5

Receipts from Entertainments.....\$943 66

Total.....\$8,996 66

List of Honorary Members.

AMERICAN.	* Deceased.	FOREIGN.
Baird, Spencer F, Washington.		Carpenter, Wm B, London.
Gray, Asa, Cambridge.		De Candole, Alphonse, Geneva.
Henry, Joseph, Washington.*		Hooker, Sir Joseph D, Kew.
Kirtland, Jared P, Cleveland.*		Westwood, J O, Oxford.
LeConte, John L, Philadelphia.		

List of Corresponding Members.

	* Deceased.
Abbott, Charles C, Trenton, N J.	Comstock, Theo B, Ithaca, N Y.
Agassiz, Alexander, Cambridge, Mass.	Conrad, T A, Philadelphia, Pa.*
Allen, J A, Cambridge, Mass.	Cook, Prof Geo H, New Brunswick, N J.
Andrews, Dr Edmund, Chicago, Ill.	Cope, Edward L, Philadelphia, Pa.
Arthur, J C, Charles City, Iowa.	Coues, Dr Elliott, Washington, D C.
Atwood, H F, Chicago, Ill.	Coulter, J M, Hanover, Ind.
Austin, E P, Cambridge, Mass.	Cox, E T, Indianapolis, Ind.
Ayers, Edwin C, Champaign, Ill.	Crapnell, W, New Boston, Ill.
Ayers, Miss Mary O, Champaign, Ill.	Cresson, E T, Philadelphia, Pa.
Bamps, Anatole, Bruxelles, Belgium.	Crooke, J J, New York City.
Barber, Dr Wm J, Carrollton, Miss.	Dall, W H, Washington, D C.
Barcena, Mariano, Mexico.	Dalrymple, Rev E A, Baltimore, Md.
Barfoot, Jos L, Salt Lake City, Utah.	Dana, Prof J D, New Haven, Conn.
Barler, Prof O L, Upper Alton, Ill.	Dial, Joshua, Senatobia, Miss.
Barroeta, Dr Gregorio, San Luis Potosi, Mex.	Dickey, Samuel H, Fulton, Ill.
Barrois, Dr Charles, Lille, France.	Dimmick, Dr L N, Santa Barbara, Cal.
Baylies, Rev Henry.	Dodge, Chas R, Washington, D C.
Behr, Dr. Herman, San Francisco, Cal.	Duges, Eugene, Silao, Guanejuanto, Mexico.
Behrens, James, San Francisco, Cal.	Eads, A D, Champaign, Ill.
Belfrage, G W, Clifton, Texas.	Eads, Rev R S, Bolton, Mass.
Berthoud, Edw L, Golden City, Col.	Edwards, Henry, Boston, Mass.
Bessey, Prof C E, Ames, Iowa.	Edwards, William H, Coalburg, W Va.
Bethune, Rev C J S, Port Hope, Ontario.	Emerton, James H, Salem, Mass.
Binney, W G, Burlington, N J.	Engelmann, Dr George, St Louis, Mo.
Blackshaw, Dr, Urbana, Ill.	Engelmann, Dr George J, St Louis, Mo.
Bland, Thomas, New York.	Espinosa y Cervantes, Antonio, San Luis Potosi, Mexico.
Blatchford, E W, Chicago, Ill.	Farlow, Prof W G, Boston, Mass.
Bolander, H N, San Francisco, Cal.	Faught, V R, Hamilton, Ill.
Brandigee, T S, Canon City, Col.	Fitch, Dr Asa, Salem, N Y.
Brendel, Dr Fr, Peoria, Ill.	Field, Burr R, Baltimore, Md.
Broadhead, G C, Pleasant Hill, Mo.	Firor, V M, Charlestown, W Va.
Brous, Harry A, Manhattan, Kansas.	Foreman, Dr E, Washington, D C.
Burgess, Edward, Boston, Mass.	Forbes, S A, Normal, Ill.
Burgess, Rev R, Ames, Iowa.	Gardner, James T, Albany, N Y.
Burnell, Levi, Milwaukee, Wis.	Gentry, Thomas G, Germantown, Pa.
Butler, James D, Madison, Wis.	Gill, Theodore, Washington, D C.
Calkins, W W, Chicago, Ill.	Glover, Townend, Washington, D C.
Canby, W M, Wilmington, Del.	Goodale, Prof George L, Cambridge, Mass.
Carr, Lucien, Cambridge, Mass.	Graham, Mrs Lizzy Allen, Davenport, Iowa.
Caton, J D, Ottawa, Ill.	Greene, Rev Edw L, Denver, Col.
Chambers, V T, Covington, Ky.	Gregory, Prof J M, Champaign, Ill.
Chapman, Dr A W, Apalachicola, Florida.	Griffith, Lieut J E, U S Lake Survey.
Clarke, Robert, Cincinnati, Ohio.	Gunning, W D, Boston, Mass.
Cleveland, D, San Diego, Cal.	Gunther, Otto, Worcester, Mass.
Clinton, George W, Buffalo, N Y.	

- Guyot, Prof Arnold, Princeton, N J.
 Hagen, Dr Herman A, Cambridge, Mass.
 Haines, Mrs Mary P, Richmond, Ind.
 Hall, Prof James, Albany, N Y.
 Hall, M S, Wilmington, Ill.
 Harford, W G W, San Francisco, Cal.
 Harkness, Dr H W, San Francisco, Cal.
 Hawkins, B Waterhouse, Philadelphia, Pa.
 Hayden, Dr F V, Washington, D C.
 Herrera, Alfonso, Mexico
 Higday, Dr T, La Forte, Ind.
 Hinrichs, Dr Gustavus, Iowa City, Iowa.
 Hoes, Malvern W, Ph D, Ward, Col.
 Ingersoll, Ernest, Jersey City, N J.
 Jones, Dr Joseph, New Orleans, La.
 Jones, Thomas J, Coal Valley, Ill.
 Jones, Capt Wm A, Charleston, S C.
 Johnson, Dr H A, Chicago, Ill.
 Kellogg, Dr A, San Francisco, Cal.
 Kirby, Mrs Julia D, Jacksonville, Ill.
 Koch, Dr Ludwig, Nurnberg, Bavaria.
 Lapham, Dr I A, Milwaukee, Wis.*
 Lathrop, D, La Salle, Ill.
 Lea, Dr Isaac, Philadelphia, Pa.
 Lee, Milo, Rock Island, Ill.
 Leggitt, W H, New York.
 Leidy, Joseph, Philadelphia, Pa.
 Lemmon, J G, Sierra Valley, California
 Lesquereux, Leo, Columbus, Ohio.
 Lewis, Dr James, Mohawk, N Y.
 Lighton, Thomas, Rock Island, Ill.
 Lintner, J A, Albany, N Y.
 May, Enoch, Burlington, Iowa.
 McCook, Rev H C, Philadelphia, Pa.
 Mann, B Pickman, Cambridge, Mass.
 Mark, Dr E L, Cambridge, Mass.
 Marsh, Prof O C, New Haven, Conn.
 Mason, Prof O T, Washington, D C.
 Mead, Theodore L, New York.
 Meehan, Thomas, Philadelphia, Pa.
 Mendoza, Gumesindo, Museo Nacional, Mex
 Merriman, Mrs Dwight, Jackson, Mich.
 Miles, Joshua J, Clinton, Ill.
 Miller, S A, Cincinnati, Ohio.
 Miligan, Mrs J M, Jacksonville, Ill.
 Moore, W B, San Antonio, Texas.
 Morgan, Lewis H, Rochester, N Y.
 Morris, Rev J G, Baltimore, Md.
 Morse, Edward S, Salem, Mass.
 Muench, Fr, Missouri.
 Newbury, Prof J S, New York.
 Newcomb, Dr Wesley, Ithaca, N Y.
 Nipher, Prof T E, St Louis, Mo.
 Nissen, Theodore, Davenport, Iowa.
 Norton, Edward, Farmington, Conn.
 Olmstead, Prof L G, Fort Edward, N Y.
 Olney, Col S T, Providence, R I.*
 Osten Sacken, Baron C R, Heidelberg, Germany.
 Packard, Dr A S jr, Salem, Mass.
 Palmer, Dr Edward, Cambridge, Mass.
 Parker, Prof H W, Ames, Iowa.
 Parker, Nathan H, St Louis, Mo.
 Parvin, Prof T S, Iowa City, Iowa.
 Peabody, Prof S H, Champaign, Ill.
 Peet, Rev Stephen D, Unionville, Ohio.
 Philippi, Dr R A, Santiago, Chili.
 Piernas, Dr J A, Mexico.
 Porter, Thos C, Easton, Pa.
 Powell, Prof J W, Washington, D C.
 Putnam, F W, Cambridge, Mass.
 Redfield, J H, Philadelphia, Pa.
 Reilly, Albert, Davenport, Iowa.
 Reppert, Fred, Muscatine, Iowa.
 Ridgway, Robert, Washington, D C.
 Riley, Charles V, Washington, D C.
 Roe, Dr E R, Bloomington, Ill.
 Sanchez, Jesus, Museo Nacional, Mexico.
 Saunders, William, London, Ontario.
 Schmidt, Dr Emil, Essen, Prussia.
 Scudder, S H, Cambridge, Mass.
 Shaler, Prof N S, Cambridge, Mass.
 Shroyer, J E, Cincinnati, Ohio.
 Signoret, Dr V, Paris, France.
 Smith, Miss Emily A, Peoria, Ill.
 Smith, S I, New Haven, Conn.
 Snow, Prof F H, Lawrence, Kansas.
 Stearns, Robert E C, Berkeley, Cal.
 Steiniger, Oscar, Bellevue, Iowa.
 Stennett, Dr W H, Bloomington, Ill.
 Sterling, Dr E, Cleveland, Ohio.
 Stewart, J R, Toledo, Iowa.
 Stillman, Dr J D B, San Francisco, Cal.
 Strecker, Herman, Reading, Pa.
 Stretch, R H, San Francisco, Cal.
 Summers, W D, Urbana, Ill.
 Tandy, M, Dallas City, Ill.
 Tanner, Frank B, Dubuque, Iowa
 Tenney, Prof Sanborn, Williamstown, Mass *
 Thomas, Dr Cyrus, Carbondale, Ill.
 Thorell, Prof T, Uppsala, Sweden.
 Thurber, George, New York.
 Torrel, Prof Otto, Stockholm, Sweden.
 Torrey, Dr John, New York.*
 Treat, Mrs Mary, Vineland N J.
 Tryon, George N, Philadelphia, Pa.
 Uhler, Philip R, Baltimore, Md.
 Ulke, Henry, Washington, D C.
 Vasey, Dr George, Washington, D C.
 Velie, Dr J W, Chicago, Ill.
 Verrill, A E, New Haven, Conn.
 Villada, Manuel M, Mexico.
 Waldron, C F, Iowa.
 Walton, Miss Alice B, Muscatine, Iowa.
 Ward, Prof H A, Rochester, N Y.
 Watson, Sereno, Cambridge, Mass.
 Wellington, W E, Dubuque, Iowa.
 White, A D, Ithaca, N Y.

White, Dr Charles A. Washington, D C.
 Whitney, Prof J D. Cambridge, Mass.
 Whitney, Prof W D. Baltimore, Md.
 Whittlesay, Col Chas. Cleveland, Ohio.
 Wilcox, Dr H B. Three Oaks, Mich.
 Wilder, Prof Burt G. Ithaca, N Y.
 Winchell, Prof Alex. Ann Arbor, Mich.

Winslow, Dr, Peru, Ill.
 Wirt, Miss Julia J.
 Wislizenus, Dr A. St Louis, Mo.
 Wolf John, Canton, Ill.
 Woodman, H T. Dubuque, Iowa.
 Worthen, Prof A H. Springfield, Ill.
 Wright, W G, San Bernardino, Cal.

List of Regular Members.

Names of Life Members in *italics*.

* Deceased.

Adams, Walker.
Adams, Mrs Walker.
 Allen, Col Wm *
 Allen, Mrs Wm.
Bahls, John.
Balch, F A.
 Ballard, E S.
 Ballou, George H.
 Ballou, Mrs George H.
 Barler, A. U.*
 Barrette, Miss Lydia O.
 Barris, Rev W H.
 Beiderbecke, Chas.
 Berwald, John.
 Bills, J C.
 Blackmon, P S.
 Bowman, J R.
Brewster, W C.
Brewster, Mrs W C.
 Bryant, Seth P.
 Bryant, Mrs S P.
 Burdick, A.
 Burdick, Mrs A.
 Candee, Fred, Moline, Ill.
 Carmichael, Joseph E.
 Churchill, A D.
 Claussen, H. R.
 Cochran, Dr M B.
 Cochran, Mrs M B.
 Cook, Mrs Clarissa C.*
 Crandall, J A.
 Davies, John L.*
 Davies, Mrs John L.
 Davies, L S.*
Davis, Frank O.
Davison, Charison.
Davison, Ella.
 Daymude, J L.
 DeArmond, J M.
 Donahue, M.
 Dow, T T.
 Eads, Luther T.
 Farquharson, Dr R J.
Fejervary, Mrs Karolin.
 Ficke, C A.
 Fisher, S A.
 Frahm, Henry.
 French, C A.
 French, Dr L.
 French, George H.
 French, George W.
 Fulton, H C.
 Gartside, B W.
Gass, Rev J.
 Gifford, Mrs Ira M.
 Gilman, S F.
 Goldsberry, Jay.
 Gould, Miss Ella.
 Grant, Mrs James.
Griggs, F H.
 Groven, W O.
Hall, Israel.
Hall, Capt W P.
 Hancock, F W.
 Harrison, C E.
 Hastings, Frank H.
 Haupt, J G.
Hazen, Dr E H.

Hazen, Mrs E H.
 Holmes, W H.
 Howard, Mrs E M.
 Hume, John.
 Hume, Mrs John.
Hunting, Rev S S.
Hunting, Mrs S S.
 Iles, Dr T J.
 Jenckes, Rev Jos S, Des Moines.
 Jervis, Frank I, Chicago.
 Kirk, Franklin sr.
 Klug, Otto.
 Krause, Robert.
 Kruse, Conrad.
 Lambach, Henry.
 Lane, James T.
 Lane, Mrs James T.
 LeClaire, Antoine J.
 LeClaire, Joseph A.
 Lesslie, Charles C.
 Lindley, Clarence T.
 Lorenzen, Jens.
 Lowry, Miss Alla P.
Lynch, E P.
Mandeville, H M.
Mandeville, Mrs H M.
 Marsh, Mrs H C.
 Martin, Mrs H M.
 Mas in, James B.
McClelland, George P.
McClelland, Thos W.
 McGonegal, Mrs M A.
 McIntosh, Robert.
 Middleton, Dr W D.
 Middleton, Miss Mary.
 Miles, Andrew J.
Millar, Mrs S B R.
 Millar, Rolfe S.
 Miller, F H.
 Milsted, T G.
Miner, Mrs Jennie True.
 Mueller, Chris.
 Myers, Dr R D.
 Nagel, J J.
Newcomb, Mrs P V.
 Ochs, Francis.
 Olshausen, Dr J J.
 Parker, George H.
 Parker, J Monroe.
 Parker, Mrs J M.
Parry, Dr C C.
Parry, Mrs C C.
Parvin, Prof T S.
Pendleton, E H., Cincinnati.
Pendleton, Mrs E H, Cin.
 Phelps, J B.
 Phelps, Mrs J B.
 Pickering, C E.
 Pierce, S W.
 Plummer, C G.
 Potter, Waldo M, Clinton.
 Potter, Mrs W M, Clinton.
Pratt, W H.
 Pratt, Miss Frankie.
 Pratt, Miss Lucy.
 Pratt, Chester L.
 Preston, Dr C H.
 Price, Reuben S.

Putnam, Charles E.
Putnam, Mrs M L D.
Putnam, J Duncan.
Putnam, Charles M.
Putnam, John C.
Putnam, H St Clair.
Putnam, W Clement.
Putnam, George R.
Putnam, Elizabeth D.
 Raff, Miss Mary.
Renwick, James.
Renwick, William.
*Renwick, Mrs William.**
 Renwick, Miss Margaret.
 Renwick, Miss Rebecca.
 Richardson, D N.
 Richardson, Mrs D N.
 Riepe, Wm.
 Roberts, U N.*
 Roberts, Mrs U N.
Robinson, Capt T J.
 Rogers, Miss Harriet.
 Rohlis, M J.
 Rose, Roderick.
 Ross, W F.
 Rothschild, Isaac.
 Rowe, John.
 Runge, Henry.
 Russell, Edward.
 Russell, Mrs E.
 Sanders, Mrs M A.
 Sandham, John.
 Sauds, M.
 Schmidt, E H.
 Schmidt, W O.
 Sheaf, Mrs Isabella.
Sheldon, Prof D S.
Sheldon, Mrs D S.
 Sherman, Mrs W B.
 Sickels, Mrs Robert.
 Skinner, W J.
 Skinner, Mrs W J.
 Smetham, Richard.
Smith, S F.
Smith, Mrs S F.
 Smith, W R.
 Spink, George H.
Spink, Henry.
 Stewart, Mrs J B.
 Stibolt, J P.
 Stibolt, Mrs J P.
Stuyvesant, M S.
 Stuyvesant, Mrs M S.
 Sudlow, Miss P W.
 Temple, John.
Thompson, James.
 Thompson, Thomas.
 Tiffany, A S.
 Truax, Chas H, Maquoketa, Ia.
 True, D S.*
 Watkins, C S.
Whitaker, Mrs Lottie Hall.
 White, Jarvis.
 Willrodt, L H.
 Wing, George.
Woodward, B B.
 Young, J B.
 Young, Mrs J B.

PROCEEDINGS
OF THE
DAVENPORT ACADEMY
OF
NATURAL SCIENCES.

VOL. III.—PART II.

RECORD OF PROCEEDINGS.

JANUARY 10TH, 1879. — HISTORICAL SECTION.

Mr. J. A. Crandall in the chair. Four persons present.

A letter was read from Mr. Laurel Summers, of Le Claire, giving some reminiscences of the early settlement of this county. Among the donations reported were the desk, pistol, and all the remaining papers and MSS. of the late Antoine Le Claire, presented by Mr. Antoine J. Le Claire; and a pen drawing of Fort Armstrong as it appeared in 1853, from Mr. Henry Lambach.

JANUARY 11TH, 1879. — TRUSTEES' MEETING.

The President, Mrs. Mary L. D. Putnam, in the chair. Nine members present.

The following communication was read:—

To the Trustees and Members of the Davenport Academy of Natural Sciences,

GENTLEMEN:— I have learned with much surprise of my election to the Presidency of the Davenport Academy of Natural Sciences,— an honor never before conferred upon a woman. While fully appreciating the compliment, I cannot but regret your action. I should much

prefer to continue my labors for the success of the Academy in a position of less prominence and responsibility, and my personal wishes certainly prompt me to decline its embarrassing duties.

Not being present at your annual meeting, nor consulted in regard to your action, I could not decline in advance; but having been assured that were I to do so now it would seriously embarrass the Academy, my deep interest in its welfare and progress constrains me to accept the position so flatteringly bestowed, though I do so with unfeigned reluctance. In thus accepting the Presidency I am aware that I must sacrifice that disinterested and independent position, which has thus far enabled me to aid you in some slight degree, and hence during this coming year much of that work will devolve upon other members of the Academy. I must, therefore, make it one of the conditions of my acceptance that a fair commencement of a subscription to liquidate the indebtedness of the Academy be at once made, and that the assurance of the trustees and members be given that it shall be prosecuted to an early and successful termination. Your action, in its implied recognition of woman's interest and helpfulness in promoting the great cause of Science, was no less generous than just; but the "New Departure" would have been more complete had the representation of women on the executive board been enlarged. I would, therefore, respectfully suggest some action on your part with a view to remedy the inequality, not leaving me the sole female representative.

Thanking you, gentlemen, personally and in the name of my sex, for the honor conferred upon me, I remain,

Very sincerely yours,

MARY. L. D. PUTNAM.

WOODLAWN, Jan. 6th, 1879.

JANUARY 31ST, 1879. — REGULAR MEETING.

The President, Mrs. Mary L. D. Putnam, in the chair. Eighteen members and visitors present.

Reports of the Curator, Librarian, Corresponding Secretary and Publication Committee were presented, and the thanks of the Academy voted to the donors to the Library and Museum.

Mr. Fred. A. Candee, of Moline, Ill., was elected a regular member. Dr. Emil Schmidt, Essen, Prussia; M. Anatole Bamps, Brussels,

Belgium; and Dr. Charles Barrois, Lille, France, were elected corresponding members.

The President announced the following STANDING COMMITTEES for the year :—

Finance.—Chas. E. Putnam, H. C. Fulton, Wm. Renwick.

Publication.—J. D. Putnam, C. C. Parry, R. J. Farquharson, W. H. Barris, C. H. Preston.

Library.—R. J. Farquharson, E. P. Lynch, J. B. Young, Miss Lucy Pratt.

Museum.—W. H. Pratt, C. C. Parry, J. D. Putnam, J. Gass, W. H. Barris, R. J. Farquharson, C. H. Preston, J. A. Crandall, D. S. Sheldon.

Lectures.—S. S. Hunting, Geo. P. McClelland, W. F. Ross, Mrs. J. B. Young, Mrs. S. P. Bryant, Mrs. E. M. Howard.

Entertainments.—Mrs. E. M. Howard, Mrs. C. C. Parry, Mrs. I. M. Gifford, Mrs. A. Burdick, Mrs. T. W. McClelland, Miss Mary Raff, C. E. Harrison, S. A. Fisher, C. A. Ficke.

Furnishing.—E. H. Hazen, M. B. Cochran, E. P. Lynch.

Mr. J. D. Putnam exhibited specimens of various species of *Cicada*, collected by him in the west, and made the following :—

Remarks on the Habits of Several Western Cicadæ.

BY J. D. PUTNAM.

Cicada synodica Say, was quite common on the grassy plains near Denver and Boulder, in Colorado, in June, 1872. The male makes a tolerably loud rattling noise.

Cicada putnami Uhler, (Vol. II, Plate IV, figs. 3 and 4,) I have collected only upon one occasion, July 2d, 1872. It occurred in considerable numbers on some small aspen trees growing close to the water of Clear Creek, between Floyd's Hill and Idaho Springs, Colorado. The male makes a very faint chirp, differing entirely from any other *Cicada* I have ever heard. This species does not appear to have been collected since.

Cicada rimosa Say. This species was found on the same day, July 2d, 1872, and not more than a mile distant. It occurred in small numbers on some aspen trees on Floyd's Hill several hundred feet above the level of the creek. It kept itself quite apart from *C. putnami*, though they were on the same kind of trees. *C. rimosa* appears to be more generally distributed, and therefore more common

than any other species of *Cicada* in the Rocky Mountains. I found it quite plenty in the Wind River and Shoshone Mountains in Wyoming in 1873, and Hy. Edwards has sent me some specimens from Nevada that do not appear to be specifically distinct. The male makes a rattling noise, exceedingly like that of a rattlesnake. This resemblance was so close that one day in 1873, in the Shoshone Mountains, I was attracted by a noise which I took to be one of these insects, and stooped to pick it up, when I suddenly discovered a huge rattlesnake in its stead. I have the pupa skin of this species from Spring Lake, Utah, but the imagines had disappeared before my arrival, July 2d, 1875.

Dr. Parry gave an interesting account of his recent trip to Mexico, illustrating his remarks with maps, specimens of pottery, etc.

FEBRUARY 28TH, 1879. — REGULAR MEETING.

The President, Mrs. Mary L. D. Putnam, in the chair. Twelve members and visitors present.

Mr. H. T. Bushnell, Mrs. J. W. Stewart, Mrs. J. B. Young and Mrs. U. N. Roberts were elected regular members. Rev. H. C. Thomson and Miss Abbie Cochran, of Monterey, Mexico, were elected corresponding members.

MARCH 28TH, 1879. — REGULAR MEETING.

The President, Mrs. Mary L. D. Putnam, in the chair. Twenty-seven members and visitors present.

Dr. W. J. Hoffman, Washington, D. C.; Prof. Chas. Wachsmuth, Burlington, Iowa; Mr. W. C. Holbrook, Coleta, Ill.; and Prof. Roland Trimen, Cape Town, Cape of Good Hope, were elected corresponding members.

The following papers were read :

Antiquities of Whiteside County, Illinois.

BY W. C. HOLBROOK.

In this paper I propose to describe certain pre-historic structures of Whiteside county, which, for the want of a better name, I will designate "altars." In the spring of 1877, Mr. Holly, of Clyde, brought me a piece of limestone, burned and reddened by fire, that

had been turned up by a plow. I at once proceeded to examine the locality from whence it came. It was near the southeast corner of section twelve in the town of Clyde, near the center of a broad valley, about forty rods east of Rock Creek. The surface of this part of the field was very nearly level. Not the slightest trace of a mound could be observed. A gentleman, well acquainted with the field long before it was cultivated, tells me that there never was a mound or embankment there. About a foot below the surface of the soil, we found a circular stone floor, or table, six feet and three inches in diameter and a little more than one foot in height. The materials of this altar must have been carried from an outcropping of Niagara limestone, on the east bank of Rock Creek, about a mile below. Some of the stones were as large as one man could well carry, and were flat and thin. They were fitted together as well as unhewn stones could be fitted. There were three layers, one resting upon another. The rocks of the upper layer were reddened, and in the center almost reduced to lime by the action of fire.

The plow and the cultivator had, for years, passed just above this structure, but the new "sub-soiler" had grazed one stone and had brought it to the surface. The clay on top of the altar was filled with fine pieces of charcoal. The crevices of the rocks were filled with charcoal and clay. Where the three layers did not break joints, and the crevices extended to the bottom of the altar, the charcoal was found as low as the lower surface of the lower layer. The clay in the crevices appeared to be mingled with ashes, for it differed in color and texture from the surrounding clay. The heat had followed the crevices and reddened the edges of the stones of the lower layers. On removing the black soil, we found charcoal mingled with the clay twelve feet distant from the edge of the altar. Willow appears to have been the wood from which the charcoal was burned.

Having finished the examination of this structure, we began to probe the soil with sharp iron rods, and, after a half day's work, my rod grated upon rock. On removing the soil, we found a second altar, four rods and three feet southeast of the first. It was six feet and six inches in diameter, and in all respects like the first. No bones or implements were found on or about these altars. A few days ago, a finely-polished grooved stone ax, weighing six and one-half pounds, was found about two rods west of the first altar.

Burned rocks have frequently been plowed up in the northwest quarter of the southwest quarter of section eighteen in the town of

Genesee, but as the field is now a meadow I can not examine by removing the soil, and a sharp rod comes in contact with small boulders. Walking along the foot of a hill that faces the southwest, about fifty rods south of the center of section five in the same town, I observed that the recent rains had uncovered a portion of a burned rock. An oak tree, more than two feet in diameter, had once stood in the soil above this structure, but the stump was so far decayed it offered no resistance to the work of excavation. The original form is somewhat obscure, for some of the rocks were in a confused heap beneath the center of the old oak tree. It appears to have been a rude oven, or fire-place, in the bank. No implements, and but little charcoal, were found. The rock must have been carried two miles.

About a mile west of the old town of Como, the soil, in places, is filled with this burned rock. Small fragments are scattered promiscuously through the soil. A fine specimen of pottery was once found here by a farmer while digging a post hole. He sent this valuable relic to a friend in the State of New York. In this place I found several fragments of black basalt that had been in a hot fire.

On the north bank of Rock River, above Sterling, there are several groups of mounds and earthworks. In mound number one, we found the most remarkable altar ever found in Whiteside county. The mound referred to is a low, flat, circular mound, about thirty feet in diameter and four feet high. A hickory stump, ten inches in diameter, was found in the soil above the altar. On removing the soil, we found this structure, in many respects, like the one first described, except that it is oval in form, the longer diameter being six feet and the shorter four and one-half feet. The direction of the long diameter was north and south. The upper layer, for there were two layers of flat stones, was reddened, and in some places almost reduced to dust, by the action of fire. On and about this altar we found charcoal and charred human bones. Some of the bones appear to have been broken into small pieces. Six small pieces of human skulls were found. The first was a part of the frontal bone, and contained a part of the orbit of the left eye. It was about three inches long and two inches wide. The second bone examined was an irregular fragment of the occipital bone near the *foramen magnum*. The next three were thick pieces of the temporal bones, two right and one left. The last was a square fragment of the parietal bone, about an inch and one-half on each edge. These six bones were found near the west margin of the altar, and were parts of at

least two skulls. Nearer the center of the altar, buried in charcoal, we found the carpal end of the radius of the right arm. It was about three and one-half inches in length, and was charred and blackened by fire. It was not a difficult task to separate the bone and the wood charcoal, but many of the smaller fragments of bones could not be identified. I know not whether they were human or animal bones. About one-half of the left femur lay partially under one of the long flat stones of the lower layer of the altar.

Mound number two of this group was next examined. We found portions of three adult skeletons. Two were lying upon the face, with their heads to the east, and the third was lying upon the right side, with head to the west. A part of the left side of the lower jaw of a child about five years old was found near the skulls, in the eastern part of the mound; also the claws of some bird. The bones were found in a layer of black soil about ten inches in thickness. Above the black soil there was a thin stratum of charcoal. The remainder of the mound was composed of clay common to that locality.

In the "dolmen mound," we found a dry wall enclosing a quadrilateral space, about ten feet long, four and a half feet wide and four feet high. The top was covered with large flat slabs of limestone. Inside of this structure we found the remains of no less than eight persons, two finely-polished black pebbles, one fossil, and a plummet. In this mound, as well as several other mounds of this group, there were several small fragments of the above-described limestone.*

On the north bank of Rock River, below Sterling, every mound excavated contained several pieces of these charred and reddened stones. They appear to have been thrown in beside the corpse during burial, for there are no other evidences of fire in these mounds.†

Taking all of these facts into consideration, I am of the opinion, if an unbiassed witness is allowed to state an opinion, that the prehistoric men of Whiteside county burned human victims on altars once sacred to a religion now forgotten.

* For an account of this and other mounds see *American Naturalist*, Nov., 1877, Vol. XI, page 688.

† A remarkable altar has since been found a few rods east of these mounds. It was made of large flat stones, in the form of a perfect circle, and about twelve feet in diameter. In the soil below this structure, portions of five adult skeletons were found. The heads were in the center and feet at the circumference, at points equidistant. These bones soon crumbled to dust when exposed to the air. One skull was pierced by a small reddish chert arrow. This altar was found by some workmen, who gave the specimens to Dr. J. T. Everett. I examined part of the structure, and obtained some of the facts from him.

The Indian* Inscriptions of Davenport, Iowa.

BY PROF. G. SEYFFARTH, PH. D., TH. D.

The four photographed inscriptions under consideration, published in the Proceedings of the Academy of Sciences of Davenport, Iowa, Vol. 11, 1877, p. 92, and, a few weeks ago, transmitted to me for examination, are much more important than I expected. They are the first discovered phonetic and astronomic monuments of the primitive inhabitants of this country, which, sooner or later, will cast unexpected light upon the origin, the history, the religion, the language, the science and intellectual faculties of our ancient Indians. For the present, however, it is natural, no satisfactory interpretation of these Indian relics can be performed, because, without a much greater number of similar inscriptions and interior knowledge of related dialects, it is impossible to determine the phonetic values of nearly 200 characters and the lexical signification of a corresponding number of old Indian words. Another difficulty is that many characters, obvious on our Tablets, are imperfectly represented on the photographic plates, because all lines of a figure, running parallel to the direction of the light, remain indistinct, whilst scratches appear like engraved lines. It would, therefore, be a meritorious act to publish, *before all*, exact fac similes of the Tablets, taken from the originals themselves by means of a magnifying glass, as has been done with the Rosetta stone in 1812. Under these circumstances, it will not astonish the reader that the writer confines himself to but a small number of remarks, as follows :—

1. The Tablets, Nos. I, III, IV, contain nearly 200 characters, of which, however, 16 occur several times. The remaining 150 or more different figures, the human and animal delineations not being taken into account, demonstrate that the primitive inhabitants of our country did not use the simple Noachian alphabet of 25 letters, but a great number of *syllabic signs*, originated from the said alphabet, as was and is still the case in Egypt, Japan, Corea, China and central Africa. Livingston† reports that the people of Bermegai used 280 characters for syllabically expressing the words of their spoken language. From the late Missionary Gutzlaff I learned that the 40,000 Chinese types are not ideologic, but syllabic. Hence the city of Cassell was ex—

* Prof. Seyffarth uses the word "Indian" in this paper in its more general sense, as applying to all former inhabitants of this continent, and not restricted to the modern Indians.—[EDITOR.]

† Seventeen Years Explorations in Africa, Phila., 1858, page 225.

pressed by two types, of which one sounded *ks*, the other *sl*. Hence it is probable that the American Indians emigrated from a country where a syllabic method of writing prevailed.

2. If we compare the characters on the Davenport slabs with those preserved on Mexican and South American monuments, we notice instantly that many of them agree with each other, as the adjoined Plate (Pl. I, lines *d, e, f*.) abundantly evidences. Little discrepancies (Pl. I, lines *a, b, c*.) make no difference, because different hands draw the same letters differently. In comparing the Davenport signs with Mexican and South American ones I followed Prof. Wuttke's "Entstehung der Schrift," 1872, which however does not represent a great many of American inscriptions. The harmony of the Iowa, Mexican and South American characters puts beyond question that all the primitive inhabitants of America must have descended from the same aborigines.

3. It is self-evident that America must have been populated by the next nations, of course by the Japanese, Coreans, and Chinese. This conclusion is justified by the 15 Indian letters, corresponding with Chinese, Corean, and Japanese ones, (Pl. I, lines *g, h, i, k, l*.) found in Wuttke's aforesaid work. I do not doubt that scholars, being familiar with Japanese and Chinese literature, will find a hundred other antitypes of our Indian characters. The Northmen, it is true, discovered North America prior to Columbus, but the Indian characters on the Davenport monuments point us clearly to the Chinese syllabic figures, and not to the alphabetic runes.

4. It would be interesting in the extreme to read a grammatical translation of the Iowa inscriptions; but as long as Indian paleography, just being born, is in its infancy, nobody will expect interpretations of texts, of which the underlying language and the pronunciation of the elements are not yet made out. Nevertheless, the Chinese and Japanese paleography and lexicography will help to determine, sooner or later, the phonetic value of the letters and the nature of the dialect of the ancient Indians in our country. Besides, since it is not to be expected to discover Indian bilingual inscriptions, like the Rosetta and Tanis stones, the single words of the Iowa inscriptions are to be translated according to the context; but it is extremely difficult to correctly translate the single groups of an inscription, written in unknown characters, without having a great many similar inscriptions at hand, where the same groups return in other connections.

5. In addition, it is to be mentioned, that our slabs cast unex-

pected light upon the religion, civilization and science of the primitive American Indians.

Let us examine the single plates and the antiquities found in the respective mounds.*

In the mound No. 3, near the surface, too human skeletons, a fire steel, a common clay pipe, a number of shell and glass beads, and a silver ear-ring, associated with the skeletons, were discovered. From the preservation of the latter, and the said rather modern antiquities, it was concluded that "they belonged to our century."

About five and one-half feet below the surface three other skeletons came to light, near which a large number of copper beads, two copper axes, again three other ones wrapped in cloth, a number of small red stones arranged in the form of a star, two carved stone pipes, several canine teeth of the bear, one arrow head, a broken pot, two pieces of galena, and a lump of yellow ochre were reposed.
























Again, two years later, a new excavation, about fifteen feet north-west of the former was undertaken, where the following objects were found, again near the surface: A few glass beads and a fragment of a brass ring. On this occasion I remember that very similar sepulchral mounds still exist in the whole of Germany, from Thuringia to the boundaries of Polonia and Russia, and that the same extend thence to the midst of Asia. These hills, ascribed to Slavonic nations, and built prior to the introduction of Christianity in Germany,—probably, as is commonly presumed, 1000 years B. C.,—contain similar antiquities. I myself, in excavating a number of such hills, near Herzberg, in Saxony, discovered, besides numberless ash-urns and other vases of all descriptions, a clumsy ring fit for a common finger, two ear-rings, an arrow head and an ornamented knife, all of copper, or rather *bronze*, changed, however, into malachite.†

The same Davenport diggings being continued, the following relics were obtained: A small bit of copper, an artificially wrought bone, a copper axe, copper beads, fragments of pottery, a piece of yellow pigment, a piece of mica, two crystals of dog-tooth spar, some flakes of selenite, a flint arrow head, and, what is the most important of all,






















* We refer to the pamphlet, "Account of the Discovery of Inscribed Tablets, by Rev. J. Gass. With a description by Dr. R. J. Farquharson." From these Proceedings, Vol. ii, Davenport, Iowa, 1877.

† See *Seyffarth*, Bemerkungen über die sogenannten Hünengräber in Deutschland, nebst einer Tafel. < Schriften der Deutschen Gesellschaft zu Erforschung und Bewahrung vaterländischer Alterthümer. Band 1. Leipzig, 1825.



































Equal characters on different Inscriptions.

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b	 = 	 =  = 	 = 	b
c	 =  = 	 =  = 	 =  etc.	c





















































Indian signs corresponding with Mexican and South American.

d	 =  = 	 = 	 = 	d
e	 =  = 	 =  = 	 = 	e
f	 = 	 = 	 =  etc.	f

Indian signs corresponding with Japanese, Corean & Chinese.

g	 = 	 =  = 	 = 	g
h	 = 	 =  = 	 = 	h
i	 = 	 =  = 	 = 	i
k	 = 	 =  = 	 = 	k
l	 = 	 = 	 =  etc.	l

The Indian Zodiac with the Planets.

m	     =         m	
n	             n	
o	             o	
p	             p	
	<i>Dr. G. Seyffarth, Del.</i>	
	12 11 10 9 8 7 6 5 4 3 2 1	

two inscribed tablets of coal slate, of which one bears an inscription on each side.

Although the time has not yet come, as was confessed in the premises, to explain the said graphic monuments of the primitive inhabitants of our country satisfactorily, nevertheless, I shall pronounce my ideas concerning the representations on the Tablets, hoping that they will contribute a share to the final solution of the problem.

PLATE I,*

of which Pl. II is the reverse, obviously shows a sacrificial festivity of an Indian tribe. The fire and the flame upon a hill are apparent. The top of the hill is encompassed by a stone wall, probably forming the altar or the enclosure of that temple. Remember that the pagan temples in Germany were situated upon natural or artificial hills.† Subsequent to the introduction of Christianity in Germany Christian churches were built upon such hills instead of the pagan temples. A great many of similar Indian hills are to be found in America, *e. g.*, the big mound in St. Louis, the Teocallis of Mexico, and similar ones.‡ All such hills were, as is the case with that on our Tablet, Indian temples, or sacrificial mounds.

Further, near the fire, three fettered men, lying on the ground, are conspicuous, obviously the victims. Since the whole of the tribe, including the lower part of the slab broken off,—about fifty men,—are dancing and shouting round the fire, it is probable that the victims were the captured chiefs of another tribe, being conquered.

The sacrifice, moreover, is offered to the sun and the moon and the twelve great gods on the starry heaven. For the little orbs between the sun and the moon are the stars, and the two curves above them represent the Zodiac and the heavenly firmament. Thus it is evident that the North American Indians formerly worshipped the seven planets and twelve signs of the Zodiac, *i. e.*, the twelve great gods of all nations of antiquity. This result will be put beyond question by the Tablets, represented on Plates III and VII.

According to another interpretation, our slab signifies a cremation scene: but the Indians of our country, as is well known, did not burn their dead, but interred them, and on such occasions no entire tribe

* These references are to Plates I, II, III, VII, in the Proceedings, Vol. ii.

† See *Seyffarth*, Ueber Opferplätze und Religion der alten Deutschen, mit 2 lithogr. tafeln; 1842. < Neues Lausitzer Magazin. B. vi, H. 2, p. 151.

‡ See Transactions of the Acad. of Sci. of St. Louis, Vol. i, pp. 36. 97, 700.

would have danced and shouted during the annihilation of the last remains of their relations. Besides, the skeletons found in the same sepulchres record the fact that the same Iowa Indians did not burn their corpses.

PLATE II.

It is a well known fact that the history of the deluge has been preserved among the most different nations of America, and the universality of the Noachian inundation of our globe has been placed beyond the reach of controversy by an excellent treatise of Pojana.* He has collected nearly all the respective traditions and discussed his argument so carefully that he had a right to conclude with the following words: "Doubting this universal catastrophe would show how far voluntary stupid incredulity is capable to go, both in believing what is incredible and in denying what is credible."†

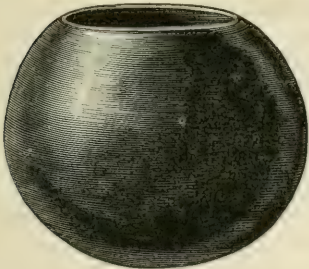
In short, the event of the deluge, even many of its particular features, are to be found not only in Genesis, in Syria, Egypt, Central Africa, Phœnicia, Greece, Italy, Scandinavia, Persia, India, Babylonia, China and Japan, but also among the ancient Mexicans, Cubani, Mitcechi, Zapotечи, Micuocanesi, and other nations of South America, mentioned by Humboldt. On a Mexican temple the deluge was represented by the image of an immense ocean, bearing only one boat, occupied only by a male and female. Instead of a dove, already forgotten by the ancient Mexicans, a humming-bird returns with the olive leaf. Now, is it not probable in advance, that the Indians of North America,—the relations of the Mexicans,—must have preserved the same history of the same deluge of the year 3446 B. C.‡

In contemplating our Davenport slab, what do we notice? First, we distinguish thirty or more animals well known in the present world, of which the most interesting is the elephant, not at all domestic in America. A number of these animals appear included in two large cages, intersected with lattice work. In the midst of these animals we see a patriarch with the scepter in his hand, and behind him a sitting woman. Apart from these we notice three other men, and three other likewise sitting women, but scattered among the animals. Query: Who are these eight persons—these four men and four women? Why are they connected with thirty different animals, of

* Della universalita del Diluvio. < Poligrapho di Verona, Vol. xi, p. 145.

† Die Allgemeinheit der Sündfluth nach Pojana und neueren Hülfsmitteln. Pilger Buchhandlung, Reading, Pa. 1881.

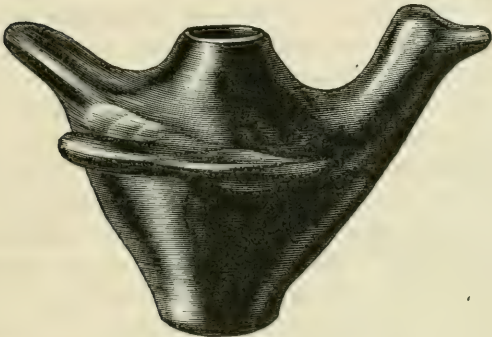
‡ See the writer's: Unser Alphabet, ein Abbild des Thierkreises vom Jahre 3446 B. C. Leipzig, 1834.



39748
($\frac{1}{3}$)



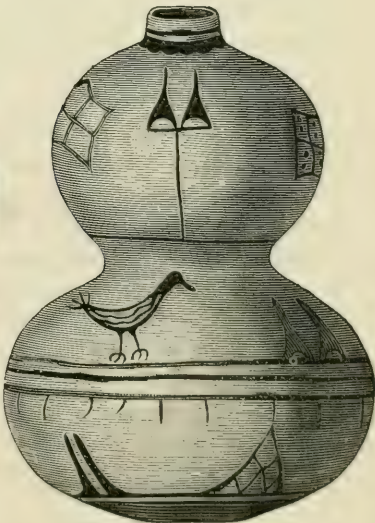
39629
($\frac{1}{2}$)



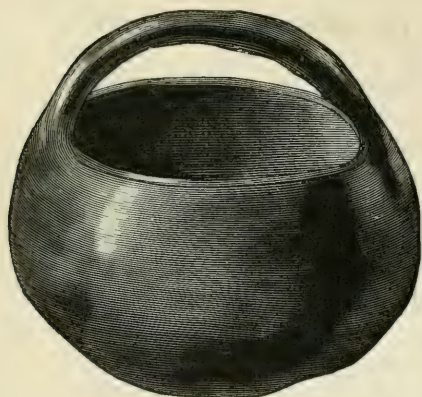
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($\frac{1}{2}$)



39824
($\frac{2}{2}$)



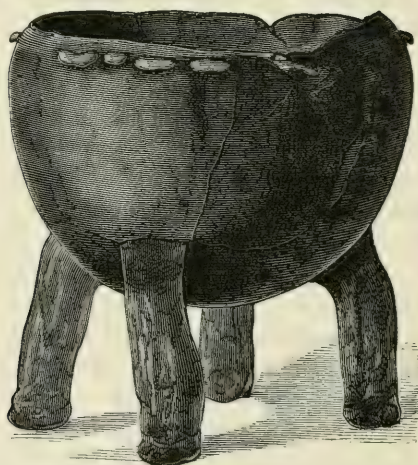
39510
($\frac{2}{3}$)



39615
($\frac{1}{2}$)



39780
($\frac{1}{3}$)



41053
($\frac{1}{4}$)



39625
($\frac{1}{2}$)



39650
($\frac{1}{3}$)

which several are *engaged*, and hence preserved for a future time? What has the elephant to do with North America? I should think these particulars abundantly evidence that our Tablet is a memorial of the Noachian deluge, and a commentary to all other American traditions confirming the latter. It makes no difference whether this slab was engraved in America or in that country from which the first Indians emigrated; whether it was the work of that man in whose grave it was discovered, or was a sacred relic preserved from generation to generation.

According to another opinion, this Tablet presents a hunting scene. But in this case we do not understand why no hunting instruments are visible; that a patriarch, holding a cane in his hand, stands quietly in the midst of thirty animals; that four women sitting on the ground partake in this hunting scene.

PLATE III.

This is, no doubt, the most interesting and the most important Tablet ever discovered in North America. For it represents a planetary configuration, the twelve signs of the Zodiac, known to all nations of old, and the seven planets, conjoined with six different signs.

First, in the midst of four concentric circles, we see the disk or globe of the earth. The next girdle between the belt of the Zodiac and the earth is divided into four equal parts, or quadrants, each containing three signs, corresponding with the spring, summer, autumn and winter. The twelve signs run, as is the case with the Zodiacal constellations, from the right to the left hand. The figures of the signs are the same which we find depicted on Egyptian, Greek, Roman and other monuments, and called Aries (γ), Taurus (τ), Gemini ($\var�$), Cancer ($\var�$), Leo ($\var�$), Virgo ($\var�$), Libra ($\var�$), Scorpio ($\var�$), Sagittarius ($\var�$), Capricornus ($\var�$), Aquarius ($\var�$), Pisces ($\var�$). It is, however, to be borne in mind that these images are represented on the Tablet as they appear if being contemplated from the earth, *e. g.*, Gemini. Our copy, (Pl. I, line *n*.) on the contrary, represents their natural position, being clearer to the spectator.

The signs, Aries, Taurus, Gemini, are plain enough. Gemini are expressed by two sitting children, like the constellation of Gemini, at present Castor and Pollux. Cancer is expressed by the shears and the head of that animal. Leo and Virgo are likewise naturally delineated, and Virgo, as it seems to me, bears in her hands Spica (Virginis.) The same is to be said of the figures of Libra, Scorpio, and

Sagittarius. The latter is expressed by a bow and arrow, the arrow being nearly invisible. Capricornus was, as we learn from an astronomical monument of the Egyptians,* a species of antelope, and the same animal, though a little deformed, resembles our Capricornus. Aquarius and Pisces explain themselves, for the former was, on ancient monuments, very often symbolized by an amphora.

The seven planets conjoined with six signs of the Zodiac are easily recognized, for the seven characters below, Pisces, Aries, Gemini, Leo, Sagittarius, and Amphora, signify the seven planets. (See Pl. I, line *o*.) It is, however, to be deplored that the Indian names of the planets, and the pronunciation of the characters expressing the latter, are still totally unknown. Otherwise it would have been an easy task to determine the year in which the planetary configuration before us has been observed by human eyes.

For the present I can make out but the following approximate probabilities: First, the girdle next to the earth on the Indian Tablet contains the marks signifying the cardinal points of the Zodiac, in other words, the beginnings of the spring, summer, autumn, and winter of the year at that time, as we have seen (p. 77.) Those three short lines placed below Pisces, and Gemini, and Virgo, and Sagittarius, (Pl. I, *p*.) argue that at that time, at the beginning of spring, the sun stood in Pisces. Further, since the ancients were in the habit of observing the planets on the cardinal days,† and commonly on the day of the vernal equinox, it is probable that the figure, Pl. I, line *o*, 12, signifies the sun, and this is confirmed by the two planets referred to Aries, (Line *o*, 1.) For, since Aries contained two planets, and since Mercury and Venus stand always not very far from each other and from the sun, it is very credible that No. 12 signified the sun, and the two characters in No. 1 were the planets Mercury and Venus.

Consequently, it being known that in 1579 B. C. the sun entered the constellation of Aries on the day of the vernal equinox, our planetary configuration may have been observed before the year 1579 B. C. The result will certainly be confirmed as soon as the astronomical significations of the characters Nos. 1, 3, 5, 9, 11, 12, will have been fixed by other researches, which is not impossible. At least, it is to be borne in mind that no planetary configuration like that depicted on our Indian Tablet occurs twice during a period of 2146 years, and

* *Seppharth*, *Berichtigungen der alten Geschichte*. 1855, p. 137.

† See the writer's *Astronomia Aeg.*, 1833, and *Berichtigungen der alten Geschichte*, 1835.

that the ancients, being destitute of the Copernican system and planetary tables, could not determine the places of the planets for earlier times.

PLATE VII.

Another remarkable Indian antiquity published in the same Proceedings of the Academy of Sciences of Davenport, Iowa. It contains the same phonetic characters represented in the aforementioned slab, and deserves to be explained as far as possible.

The whole is, as it seems to me, a mémorial of a great eclipse of the sun, observed in a certain hour of a certain day of a certain month of a certain year of an Indian king.

The figures of the sun and moon having been recognized on Plate I, we see that the disk of the moon covers that of the sun by nearly ten inches, which is a rare and was a terrible phenomenon for ancient people.

Both bodies appear between the feet of Mars, the god of war, who bears in one hand a lance, in the other a shield, the characteristics of Mars. Upon his head we see a hut or cottage, signifying the hut or the house of Mars. This planet, however, possessed two houses, viz., the Zodiacal signs Taurus and Sagittarius; but it will be seen below that Taurus had been in view.

It is not impossible that the figure of Mars, as signifying the planet, represented a conjunction of Mars with the sun and the moon during the eclipse, and the face on the breast of Mars favors this presumption; but in this case the hut upon Mars remains inexplicable.

The images of an eagle and a wolf above Mars probably express the Decuriae of Jupiter (eagle) and Mars (wolf), belonging to the sign Taurus, as will be seen in the writer's *Astronomia Aegyptiaca*, Pl. I. In this case the sun must have stood in Taurus 10° whilst the obscuration happened.

Concerning the Indian letters joined with the figure of the god of war, we venture to add a few presumings. Should the first sign on the left represent the pupil, and hence the sun (*Kor*), as was the case in Egypt and Persia, this sign signified, phonetically, king. The following characters contain, perhaps, the word *ag*, mighty, and then the name of the king. The following figures may contain the words: First, *Korp*, solar cyclus, for the little orb is, as we learn from the Egyptians, cyclus. The following two lines signify II and the added three orbs, the plurality of the preceding, give two monthly cycles. The following XI, accompanied by the same three orbs, involve eleven days. The concluding diagram, containing X cross lines,

would point us to the tenth hour of the day in which the eclipse took place. The added three little orbs again signify cycles. But these are guess-works, which can be confirmed or refuted by future paleographic researches. We return to the reliable results obtained by the unparalleled Davenport antiquities, of which the following are the most important ones ;

1. The primitive inhabitants of North America were no preadamites, nor offsprings of the monkeys, but Noachites.

2. They belonged to the same nation by which Mexico and South America were populated after the dispersion of the nations in 2780 B. C.*

3. The literature of the American Indians evidences that they emigrated from Japan, or Corea, or proper China.

4. They must have come over prior to the year 1579 B. C.

5. Our Indians, as well as those in Mexico and South America, knew the history of the deluge, especially that Noah's family then consisted of eight persons.

6. The primitive inhabitants of America were much more civilized than our present Indian tribes.

7. The former understood the art of writing, and used a great many of syllabic characters, based upon the Noachian alphabet, and wrote from the left to the right hands, like the Chinese.

8. They were acquainted with the seven planets and the twelve signs of the Zodiac, and they referred the same stars to the same constellations as did the Chaldeans, Egyptians, Greeks, Romans, etc.

9. They had solar years and solar months, even twelve hours of the day. They knew the cardinal points of the Zodiac, and the cardinal days of the year.

10. Their religion agreed with that of the Babylonians, Egyptians, Assyrians, Greeks, Romans, etc., because they worshipped the planets and the twelve gods of the Zodiac by sacrifices. Compare Isaiah 51, 7 : "Babylon hath been a golden cup in the Lord's hand that made all the earth drunken ; the nations have been drunken of her wine ; therefore the nations are mad." Plutarch, De Is. p. 377 : "There are no different deities to be found among the Greeks and the barbarian nations, either in the northern or southern countries." Quite the same is reported by Cicero, Aristotle, Diodorus, Tacitus, and other ancient authors.†

* See the author's Summary of recent discoveries. N. Y., 1857, p. 93.

† See the writer's "Grundsätze der Mythologie und alten Religionsgeschichte. Leipzig, 1843."

APRIL 25TH, 1879. — REGULAR MEETING.

The President, Mrs. Mary L. D. Putnam, in the chair. Sixteen members and visitors present.

Mr. E. A. Oliver, Mr. L. B. Oliver, and Mrs. Mary E. Brown, were elected regular members. Mr. Chas. A. Crampton, Moline, Ill.; Dr. Emil Brendel, Tremont, Ill.; Col. D. W. Flagler, Rock Island Arsenal, Ill.; Prof. N. H. Winchell, Minneapolis, Minn.; Mr. Henri De Saussure, Geneva, Switzerland; Mr. Clarence King, U. S. Geologist; Lieut. G. H. Wheeler, U. S. A.; Mr. H. N. Patterson, Oquawka, Ill., and Dr. G. Seyffarth, New York City, were elected corresponding members.

Mr. Pratt presented a statement of the facts concerning the finding of an elephant pipe.*

MAY 16TH, 1879. — GEOLOGICAL AND ARCHÆOLOGICAL SECTION.

Rev. W. H. Barris in the chair. Five members present.

It was decided to divide the Section and form separate Geological and Archæological Sections. The following By-Laws were adopted subject to the acceptance of the Trustees :

By-Laws of the Archæological Section.

SECTION 1. This Section shall be known as the Archæological Section of the Davenport Academy of Natural Sciences.

SEC. 2. Its object shall be the study of the history, customs and condition of prehistoric races, the exploration of ancient burial places, mounds, and other ancient structures, and the collection for the Academy Museum of articles pertaining to that department.

SECS. 3, 4, 5, 6, 7. Same as printed on page 16, Vol. II, of the Proceedings.

By-Laws of the Geological Section.

SECTION 1. This Section shall be known as the Geological Section of the Davenport Academy of Natural Sciences.

SEC. 2. Its object shall be the study of local geology and of geology in general, including Palæontology and Mineralogy, and the collection of specimens for the Academy Museum.

SECS. 3, 4, 5, 6, 7. Same as printed on page 16, Vol. II, of the Proceedings.

* See the Proceedings of the Academy, Vol. ii, page 349.

MAY 30TH, 1879. — REGULAR MEETING.

Mr. W. H. Pratt, Vice President, in the chair. Ten persons present.

Mr. John E. Parry, Sandy Hill, N. Y., and Mr. Frank W. Taylor, Davenport, were elected regular members. Mr. Eugène Simon, Paris, France, was elected a corresponding member.

JUNE 2D, 1879. — SPECIAL MEETING.

Mr. W. H. Pratt, Vice President, in the chair.

On motion of Rev. S. S. Hunting, a committee consisting of Dr. C. C. Parry, Rev. W. H. Barris and Dr. R. J. Farquharson was appointed to prepare resolutions expressive of the sorrow of this Academy over the death of John Caldwell Putnam, a life member of the Academy.

The committee reported the following resolutions, which were unanimously adopted :

In view of the sad event which has recently stricken from the list of the living the name of John C. Putnam, one of our youngest life members and a son of our respected President, we desire hereby to record in fitting words an expression of our sorrow in this our bereavement.

Science mourns the loss of the veteran falling in the midst of his successful labors, and mourns no less the departure of the young and talented, who, by education, character and inherited ability, give promise of future usefulness. Over each funeral urn she drops the unavailing tear, and gives expression to sorrow "That makes the whole world kin." Realizing everywhere, in nature and in human life, the unknown and incomprehensible, she recognizes a power that never errs and a law, immutable in the right and true. Bowing in the presence of this awful majesty, she can but say, "It is the Lord," and in the language of one of old, "Let him do that which is good in his sight."

To the bereaved family, and especially to the sorrow-stricken mother, who realizes as no one else the bitterness of blighted hopes and the loss of cherished affections, we tender our sincerest sympathy. Therefore,

Resolved, That this expression of our sympathy and regard be spread upon the records of the Academy and a copy of the same be presented to the family of the deceased.

C. C. PARRY,	} Committee.
W. H. BARRIS,	
R. J. FARQUHARSON,	

JUNE 27TH, 1879. — REGULAR MEETING.

Mr. W. H. Pratt, Vice President, in the chair. Seven members present.

Rev. J. D. King, Edgartown, Mass., was elected a corresponding member.

The following paper was read :

Explorations in Idaho and Montana in 1878.

BY PROF. E. L. BERTHOUD.

In 1878 I made an extended exploration of the Territories of Idaho and Montana. This included not only the instrumental part of a thorough railway survey, but also a critical examination of the natural and artificial productions of that region embraced between British America on the north and Ogden, Utah, on the south, and from the head of the Yellowstone River on the east to the valley of Hell Gate and Wisdom River on the west, a region we found replete with the most interesting natural scenery and the most striking objects that it has ever been our fortune to witness.

Without undue egotism, I really believe that for varied, rare and beautiful scenery, for a full exhibition of all the abnormal phenomena of fire, air and water, this portion of our republic exceeds any similar extent in any other region under the sun. Montana Territory is a land full of wonders, and, with Idaho Territory, they seem to form an area of surface where the former energies, so potently exerted in past geological ages, have not yet found a rest. The cosmographers and philosophers of the Middle Ages were wont to ascribe many phenomena, many geognostic facts, to the "plastic effects of Nature," as if the earth had in itself some free agency power to control its phenomena. Were this so, they could have found some color to this fancy in the variety of natural objects of nature's energies so liberally found in these two Territories.

Idaho Territory is a veritable "Phlegraean Field." My unknown friends of the Academy can imagine a vast flat plain, covered from the foot of the mountain ranges of Eastern Idaho for several hundred miles west with an uniform close covering of sage brush—the *Artemisia tridentata* of botanists, or, as the Canadian voyagers three quarters of a century since called it, "*absinthe*." This gives an uniform dull gray tint of inconceivable melancholy to

what in other respects would often be charming and picturesque. From this plain, formed wholly of lava, covered with a thin coat of sand, and still scantier stratum of vegetable soil, which, however, is generally absent, and nothing grows upon this sterile surface but cactus and artemisia.

The lava plain of Idaho is seamed in a few places by some unimportant streams, the major part of them emptying into Snake River, or its main affluent, Henry's Fork. Aside from this, universal drouth prevails, and $\frac{99}{100}$ ths of Idaho is doomed to eternal sterility. Universally, all the rivers and smaller creeks flow in deep crevices in black honey-combed lava, abounding in rapids and deep pools of cool, clear water, and in magnificent trout. Snake River, the main southern branch of the majestic Columbia, has cut out its bed in this dark lava. It is a fine deep river, swift, impetuous and dangerous. The American Falls, some 70 miles below Fort Hall, are stupendous and magnificent. Here the whole water of this magnificent stream is precipitated down a step in the lava field over 140 feet high.

In the course of our exploration, when surveying our return line by the valley of Madison Fork and Fire Hole River, we left the last named stream on our left, and to avoid its steep and tangled cañons, we prolonged our line of survey over the main Rocky Mountain range by Reynolds' Pass to Henry's Lake, the source of Henry's Fork of Snake River. From this lake we turned sharply, eastward crossed the Rocky Mountain by the Tahgee Pass, 7470 feet above the sea, and reached Fire Hole Valley and the marvelous geysers of the National Park by an easy natural wagon road.

Fire Hole River, from the west edge of the National Park to the several geyser basins, flows through a valley cut through lofty, picturesque, but ragged Trachyte Mountains, covered with scrub pines, with glades interspersed, clothed with scanty grass. The first cañon in the National Park is grand and weird, seamed with traces of recent volcanic action. Its wildness was rendered more salient from our continued watch night and day to prevent surprise from small bands of hostile Indians driven eastward by Gen. Howard's campaign against hostile Piutes and Bannocks. With some labor, and by vigorous exertion, we carried our line of reconnaissance up to the Upper Geyser Basin, our wagons being the second only that have penetrated to that point.

I confess that my ideas are barren and my mind bewildered by

the amount of objects that three days' exploration of that extraordinary region developed. We were then in the first days of October. Before reaching the geyser region, hard frosts at night, and a temperature one morning to zero Fahrenheit, rendered our couches on the volcanic soil cold and restless. Once, however, in the midst of this region of subterranean fires and lakes of scalding water, we felt no more the cold chill of the lower valleys. A soft moist air in the day, foggy mists, or columns of steam, rendered more visible from the greater coolness of the atmosphere, made our mornings enjoyable by their novelty. In the pines, in the open prairies along Fire Hole River, we could see the steam rising from myriads of scalding springs or clear basins of scalding water. Occasionally a magnificent column of steam and boiling water would rush aloft swiftly and play from one to ten minutes in duration. Old Faithful, the Giant, the Giantess, the Castle geyser, the Beehive, the Fountain, and a countless host of smaller spurting fountains made it difficult to follow any determined course. Everywhere—above, below, around—the hidden energies of subterranean forces were manifest. When near some of the more active vents—some of the more demonstrative *safety valves* they might be called—we could hear the smothered, labored pent-up groans, or what one would imagine were the desperate struggles of some cavern-full of struggling life striving to escape. We stood, as it were, in the mythological Hades; we wandered in imagination on the banks of Cocytus.

“Cocytus, named of lamentations loud
Heard on the rueful stream.”

The whole ground surface in the geyser basins seems to be made up wholly from the varied mineral deposits of the countless myriads of hot springs. We notice in every direction a peculiar resonance when we ride or drive over the ordinary surface. We seem to wander over a dome erected over immense subterranean lakes of pent-up steam and boiling water. At the surface, the general boiling point varied from 199° to 200°. Dr. Peale, however, (who was then in the Park,) informed me that a self-registering thermometer shoved some 15 or 16 feet down the geyser orifices gave him a temperature of 209°, evidently due to an abnormal compression, having in these subterranean reservoirs raised the boiling point.

The National Park is well worthy of that title, and for future time its capabilities and its surprising natural phenomena will always ren-

der it of most extraordinary interest. I can say but little of the fauna and flora of the National Park. Elk, moose, deer, antelope, mountain sheep, bears, wolves, wild cats, lynx, rabbits and porcupines, with some beautiful foxes, were all we obtained. Birds were scarce, and of only fifteen species, including an abundance of ducks, geese, swans and sage hens. We were too late for summer flowers, and generally the whole of the sylvia of the park consist of a pine, red fir, spruce, one species of cottonwood, and the ever-present quaking aspen; scrubby willows and some insignificant bushes of *Rhus* and *Cornus* complete nearly the whole list.

Completing our surveys in the Park, we turned to the west again, reached Henry's Lake, and tried to follow the west side of Henry's Fork to Snake River. Baffled in this, we traveled westward to Camass Creek, reached the regular stage road at Beaverhead Cañon, and finally reached Fort Hall and Portneuf River October 19-20, '78.

During this whole journey I have made continued examinations for archaeological relics, but had very little success until we reached Upper Madison Fork. Here and around Henry's Lake, Henry's Fork and Beaverhead Cañon, and on Market Lake and Snake River I have gathered some very characteristic obsidian implements which I transmit to the Academy for illustration. [Figs. 1 and 2.]



Fig. 1. Nat. size.

I have always understood, until within a few years, that the presence of obsidian weapons in Kansas, Colorado, Nebraska and Wyoming, and in Utah also, was due to the probable intercourse of exchange from the Indians, or we may say Aztec races, of Mexico, with the more northern tribes. I am satisfied that whatever obsidian arrows, lance heads and leaf-shaped implements I have found in Colorado, Wyoming, Nebraska, etc., were more probably derived from the Yellowstone and from Snake River rather than from New and old Mexico. Obsidian implements begin to abound from Great Salt Lake northward; and on Portneuf and Snake and Henry's Fork of Snake River, in the National Park, and on Madison Fork; its abundance everywhere, both wrought and unwrought, ceased to become extraordinary or noticeable. I have been assured by reliable, trusty residents of Idaho and Utah Territories that even to this date, not farther back than fifteen to twenty years ago, they have repeatedly seen the Bannock and Snake Indians of that region make themselves arrow heads of obsidian,

beautifully and skilfully worked out of flakes, by a simple process of slow clipping on the edges by means of a buckhorn tool, with a cross notch, holding the flake in a piece of buckskin so as not to cut their hands on the fresh sharp edges of the obsidian flake.

In the National Park Prof. Hayden's parties found a gorge in the mountains which is almost entirely formed of volcanic glass; they have aptly named it Obsidian Cañon. Here, evidently, the material has been used from time immemorial for flaking and conversion into implements. The most common form I have found was leaf form, some of them as much as five or six inches long and well proportioned. Some arrow heads of obsidian, unfortunately lost in the mountains, are beautifully and regularly worked, and one especially was as if made only a few days before, as it retained an edge and a point as keen as a razor.



Fig. 2. 1-2 nat. size.

The antiquities I have noticed and examined on Madison Fork, extend along the river for three or four miles. These consist of large rings of stones, generally rounded and water-worn. Some of them surround low mounds now scarcely one and one-half feet high, as if an old wall around the mound. These were mostly noticed about twenty miles southeast of Virginia City. Going south from them about one and one-half or two miles, and in the open

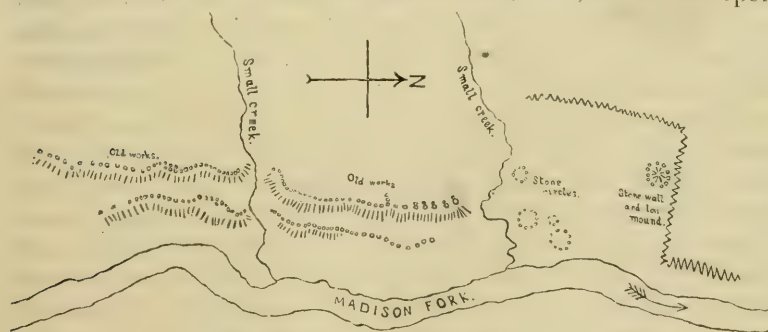


Fig. 3.—Scale, 1 mile to 1 inch.

bottom lands on west side of the Madison Fork, we found a singular series of remains, the use of which it is difficult to conjecture. These remains generally follow the edge of a slight step or terrace, of which Madison Valley offers numerous examples that extend for

miles on each side as regularly as if artificially constructed. I inclose a sketch map [Fig. 3] showing their topography. The remains are small piles of stone set at regular distances, sometimes connected by a low cobble-stone wall now all in ruins, and noticeable only from their regular ridge-like form. Occasionally we find stone circles, stone mounds, though very small, but all regularly disposed on an uniformly conceived plan. In Idaho Territory we found some low stone mounds on the top of numerous high hills and mountains, but they represent no present use, except to mark signal stations, or occasionally a lone grave covered with the surrounding detritus and rounded boulders.

At a meeting of the Trustees, held July 30th, 1879, it was voted to charge an admission fee of 10 cents for adults and 5 cents for children to all persons visiting the museum except members.

SEPTEMBER 26TH, 1879. — REGULAR MEETING.

Dr. C. C. Parry, Vice President, in the chair. Twelve members present.

Dr. S. H. Drake, West Union, Iowa, and Dr. C. C. Bradley, Manchester, Iowa, were elected corresponding members.

Dr. Parry made some remarks on the cause of hay fever, which has been attributed to a certain weed (*Ambrosia artemisiaefolia*) by people in Wisconsin and Illinois.

Mr. Pratt stated that Mr. Gass had recently explored a mound near Edgington, Ill., in which was found a roughly-shaped copper "axe," a flint arrowhead, and a pipe of the usual mound builders' pattern, carved to represent some animal—apparently a seal or a porcupine.

Mr. Pratt presented the following notes :

Explorations of Mounds at Albany, Ill.

BY W. H. PRATT.

Having learned that some explorations had recently been made in the mounds at Albany, Whiteside county, Ill., I recently visited that place to learn the particulars.

I found that Mr. C. A. Dodge and some friends had opened three of the mounds on the hill and some in the low ground of the group

described in our Proceedings, Vol. I, page 103, and he kindly gave me a careful description of his observations.

He says the human bones were exceedingly numerous in every case, and usually in no regular order, though "the positions in which the majority of the skulls were found indicate that the bodies were buried with the heads in to the center."

In one mound on the low ground he found as many as twelve skeletons in a space of four feet square. He says, "in one mound on the hill I found, after digging five feet, a bed of ashes eight inches thick, and then a bed of charcoal of the same thickness, and as nice as if it had been burned to-day. In another mound on the hill, at the depth of seven or eight feet, there were at least seven or eight skeletons, some small and others large, but only one in such a state of preservation that it could be handled without falling to pieces, and this was about five feet eight inches high." This he secured in pretty good condition. It was evidently buried "in a sitting posture, and had the ribs around the skull. The face was to the northwest, and directly toward the river." In this mound he also found a "bowl" of fine, compact, firm clay pottery, well burned, of a clay color, but much blackened outside, apparently by smoke. It is evidently of a quite different quality from other vessels we have found in this vicinity. It is $4\frac{1}{4}$ inches in diameter and $2\frac{3}{4}$ inches in height; capacity, about 30 cubic inches, and much ornamented on the outside.

This bowl had apparently been placed, inverted, on the top of a skull, but the latter was quite decayed except the portion which was covered by the bowl. This piece of skull he preserved.

Inscribed Rock at Sterling, Ill.

BY W. H. PRATT.

On a recent visit to Sterling, I was shown by Dr. J. S. Everett, Secretary of the Sterling Scientific Association, an inscribed rock recently exhumed in grading the race track in the new fair grounds at the south edge of the town.

It is a mass about $3\frac{1}{2}$ by $2\frac{1}{2}$ by 2 feet of Galena limestone, having on one side a somewhat flat surface—natural, not ground—about 20 inches in diameter, on which have been rudely cut or picked with some blunt instrument—probably a stone—a few large, coarse figures.

No connected design or plan can be traced in them, or any signifi-

cant figure, except, perhaps, a human face, which, if so intended, is very indistinct.

The most curious circumstance connected with it seems to be that the stone was buried *with the inscribed side downward* on the drift, covered with three feet of alluvial terrace deposit, in what had once been the bed of Rock River. The only place in the neighborhood where the same kind of rock is found in place is sixteen miles farther up the river.

Dr. Everett remarks that "possibly the block (of a ton weight) may have been brought down in the ice and inscribed on the spot to mark the site of a battlefield, for both above and below, for a distance of three miles, there are numerous mounds containing immense quantities of human bones, usually indiscriminately buried and sometimes partially burned." I learn that no relics or weapons are found there, except an occasional arrow head, one of which, by the way, was found still sticking in a skull. Dr. Everett has both skull and arrow in his office.

Exploration of a Mound on the Allen Farm.

BY W. H. PRATT.

On September 5th, 1879, Mr. Gass, Mr. Lindley, Mr. Christian and myself went down to Col. Allen's farm to explore the one remaining mound of that group.*

At a depth of about four feet, we found four skulls in a badly decayed and broken condition, so that they could not be preserved, and a portion of the other bones, but so few as to make it probable that but a portion of the four skeletons had ever been buried there. One piece of lower jaw, quite a number of the long bones, and a few of the others, were found,—but no vertebræ or ribs. The skeletons were lying nearly in an east and west direction, heads westward.

The only relics were a poor discoidal stone, two fragments of stone implements and two small copper beads made of very thin, apparently hammered, copper.

There were no ashes or charcoal in any portion of the mound, no charred wood or bones, and no traces whatever of the action of fire.

This completes the exploration of that prominent group, all of which have, I believe, been thoroughly examined and reported,

We have recently received, by the kindness of Col. R. M. Lit-

* See these Proceedings, Vol. II, pp. 148 and 154.

tlar, one of the skulls exhumed from Mound No. 5, where the house was built in 1871. It is an especially interesting one on account of its peculiar shape, remarkably broad at the base, and "gothic" form; and also from the fact that several "rondelles" have been sawed out from it on each side.

The Smithsonian Institution has also kindly presented us with the vase—which however is in fragments—taken from Mound No. 6, and sent there by Col. Crawford as heretofore mentioned.

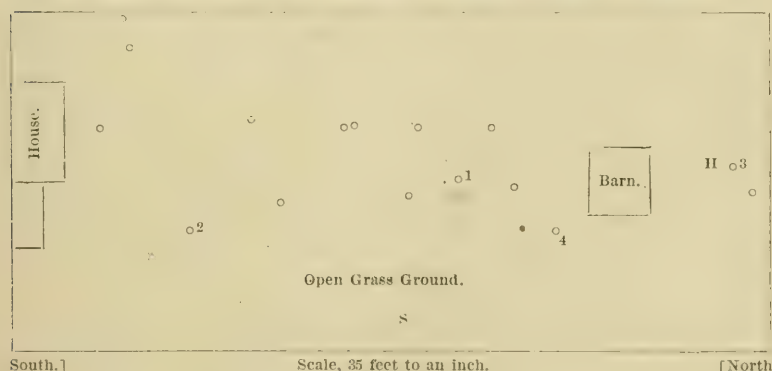
Lightning Phenomena at Blackhawk.

BY W. H. PRATT.

During the night of August 13-14, 1879, the family of Mr. Kistenschacher, residing on the edge of the rather low bluff in Blackhawk district, two miles west of this city, were startled by a terrible crash, and going out to see what had happened, Mr. K. found that the lightning had "struck" a tree near the house.

Our friend, Mr. Wm. Riepe, who resides in a house but a few rods distant, at the first opportunity, called my attention to the phenomena exhibited there, and together we made a very careful examination of the place.

The house is situated on a southwestern slope, elevated some 40 feet above the flat land of the Blackhawk bottom, and the land just back (northeast) of the house is a few feet higher. The house is a small one, built of brick, and without a lightning rod. Immediately



north of the house is a grove of thrifty oak trees, ten to twenty feet apart and 40 or 50 feet high, and just west of this little grove the

ground slopes very considerably west-southwest. The positions of house, barn, trees, etc., are shown in the accompanying diagram.

The grove extends no farther eastward than the line of the east side of the house and barn. Some 50 feet farther east is a north and south line of wire fence, and the space between is a grass plat. The tree near the corner of the barn (No. 4) though not the tallest tree of the group, is the highest of them all as it stands on higher ground.

Upon examination, we found that the tree numbered 1 in the figure, nine inches in diameter and 40 feet high, had a splinter torn off, taking, at the ground, about one-sixth of the trunk of the tree, diminishing upward, and running out about eleven feet from the ground, the bark being torn two feet farther up. This splinter included four feet in length of a root running southward, and was thrown out and lying about ten feet from the tree, the bark all being off it. The sod was broken only three feet from the body of the tree, though the splinter thrown out was one foot more. On digging, we found the remainder of the root, one foot beneath the sod, shivered to shreds and loose, not only where the splinter was torn out but two feet farther. A small limb, six feet from the ground, on the same side of the tree (south), was torn off, and showed the disruptive force in an upward direction from the tree. The internal wood in each case was shattered into fine slivers. None of the upper or outer limbs showed the slightest injury. In the trunk of the tree, marked 2, we found, on the northeast side, four feet from the ground, a hole which at first glance appeared like a bullet hole, but on inspection it was apparent that the disruptive force was here also exerted outward. The brush-like fibres of the wood, formed by the discharge, pointed wholly outward. The hole was half an inch deep in the wood and somewhat less in diameter, and the whole interior was finely torn-up wood fibres. Very little bark was displaced around the opening. Three feet directly above the hole just described, it was discovered that the tree had been split open for the length of a foot or two, and some fibres of wood or inner bark were still protruding directly outward through the bark, showing that this crack had gaped for a moment while these were pushed outward and then closed again. *The bark about this crack was not disturbed*, which indicates a wholly internal action of the disturbing force. No other portion of the tree appeared to have been touched.

At H, north of the stable, a horse had, as it appears, been standing under the tree, No. 3, for, on going to look for him in the morning,

he was found lying there, having apparently fallen lifeless without the smallest struggle. On the south side of that tree, and about five feet from the ground, was a limb, two inches thick, extending out directly over the back of the horse as he stood there. The under side of this branch, for a few inches in length near the body of the tree, was torn to fine shreds in a manner which plainly showed the same *outward* explosive action. No other part of this tree was injured, and none of the other trees were at all disturbed.

At S a cow was tethered to a stake in the grass ground, but entirely uninjured.

I do not propose to advance any theory, but the idea suggested to my mind by these phenomena is something like this: Suppose the molecules of a body of wood, or any other substance, to be by some cause forced out of their normal position of equilibrium and thus held in a state of extreme tension, or, to illustrate, suppose millions of millions of spiral springs in each cubic inch, and each wound up tightly and strained to the uttermost and held so. Then, suppose this strain to be released instantaneously and each spring, or each molecule, to return to its normal position with a movement which, though occupying but an infinitesimal fraction of a second, should, during that time, have a velocity of thousands of feet per second. It is quite conceivable that such intensely rapid molecular motion might so disturb the intermolecular relations while passing from the abnormal to the normal position, as not merely to overpower but to neutralize and suspend cohesion. Such an extreme velocity of motion in the mass, representing an immense amount of energy, instantaneously arrested, would be converted into a corresponding amount of some other form of energy.

It seems to me that we have a rude analogy for this, enough, at least, to aid in the conception of such conditions, in the familiar case of "Prince Rupert's drops." In these, as is well understood, the molecules of the glass are in a state of such high tension that though—undisturbed—they will maintain their abnormal position in relation to each other for any length of time, yet, if we disturb it by making ever so small a fracture, breaking off the extreme point, the whole are instantly released, and, with suddenness amounting to an explosion, the mass is completely disintegrated, the molecules part company, and the whole is reduced to a powder.

In this view, a lightning "stroke" is such only in the sense of a *shock*, a suddenness of action or change. A person is "struck" by

lightning in the same sense as he is struck by apoplexy or paralysis. The cause, in either case, may be more or less remote and far-reaching, but the conditions and the action are local.

The phenomena above described seemed to us to indicate, not a progressive tearing force, not, indeed, merely an explosive, but rather a *disintegrating* force. It seemed as if the matter had been endowed, temporarily, with new properties, or properties unknown to us, and not manifested under other circumstances. Perhaps we may say, that the arrested motion of which I have spoken, instead of being converted into its equivalent of heat (which is but a mode of motion) may have assumed the form of a *different* "mode of motion," which mode is the one we denominate "electricity," and which is a more intense action, more rapid, hence more destructive than heat.

At a meeting of the Trustees, held September 29th, 1879, the action of the Geological and Archaeological Section, in forming two separate sections, and the By-Laws adopted by each, were approved.

OCTOBER 31ST, 1879. — REGULAR MEETING.

The President, Mrs. Mary L. D. Putnam, in the chair. Nineteen persons present.

Messrs. F. T. Schmidt, E. Geisler, H. Carmichael, and Mrs. E. M. Pratt, were elected regular members. Mr. F. S. Pooler, Albany, Ill.; Mr. L. J. Longpre, Ontonagon, Mich.; Prof. Josua Lindahl, Rock Island, Ill.; Dr. S. S. Rathvon, Lancaster, Pa.; Dr. J. N. De Hart, Whippany, N. J.; Mr. Henry C. Young, Glasgow, Scotland, and Mr. Frank Cowan, Greensburg, Pa., were elected corresponding members.

Mr. C. T. Lindley read an interesting popular paper on the boomerang.

NOVEMBER 28TH, 1879. — REGULAR MEETING.

Mr. W. H. Pratt, Vice President, in the chair. Six members present.

Mr. Benjamin Randall, of this city, made some interesting remarks on the Phenomena of Mirage, advancing some original ideas on the subject.

DECEMBER 12TH, 1879. — HISTORICAL SECTION.

Mr. J. A. Crandall in the chair. Six persons present.

The subject of the early schools of Davenport was informally discussed at some length. Mr. Pratt read a letter from Prof. John H. Tice, now of St. Louis and well known as a "weather prophet," who taught a school in Davenport in 1842-3.

The Curator reported that Mrs. M. A. Sanders had deposited in the Library of the Academy a complete file of the Davenport "Gazette" from its commencement in 1841 to 1862, the years during which her husband, the late Alfred Sanders, Esq., was editor and proprietor.

DECEMBER 19TH, 1879. — ARCHEOLOGICAL SECTION.

Mr. W. H. Pratt in the chair. Four members present.

Mr. W. H. Pratt was elected chairman and Mr. C. T. Lindley was elected secretary of the section.

DECEMBER 26TH, 1879. — REGULAR MEETING.

Mr. W. H. Pratt, in the chair. Eighteen persons present.

Mr. Henry F. Smith was elected a regular member.

Dr. Parry read a letter from Dr. G. Barroette, of San Luis Potosí, Mexico, containing some valuable information regarding the origin and introduction of the cultivated potato into Mexico.

At a meeting of the Trustees, held January 7th, 1880, the following resolution was unanimously adopted :

Resolved, That, in consideration of the important services and gratuitous labors of W. H. Pratt as Curator of the Museum for several years past, the name of Mrs. W. H. Pratt be enrolled on the list of life members of the Academy.

JANUARY 7TH, 1880. — ANNUAL MEETING.

The President, Mrs. Mary L. D. Putnam in the chair. Twenty-one members and four visitors present.

The several officers presented their reports as follows :

The FINANCE COMMITTEE,—C. E. Putnam, Wm. Renwick and H. C. Fulton,—reported the present indebtedness of the Academy to be \$1,879.67, as follows: Notes on account of building, \$1,500.00 ;

note on account of publications, \$239.90; outstanding orders, \$139.77. The interest on \$1000.00 of the building debt was decreased from 10 per cent. to 8 per cent. per annum by making a new loan and paying off the old one. The sum of \$239.90 was borrowed at 8 per cent; per annum, to pay the expense of publishing the Annual Report.

Mr. J. D. Putnam, chairman of the PUBLICATION COMMITTEE, reported that the publication of the second volume of the Proceedings of the Academy had been delayed by a series of mishaps to the plates intended to illustrate it, but that the plates had been reengraved on steel, and the printing nearly completed so that they expected the volume to be ready for distribution in a few weeks. The Proceedings of the annual meeting, held January 1st, 1879, have been printed, together with the lists of additions to the Library and Museum during 1877 and 1878, the whole forming a pamphlet of 64 pages and constituting No. 1 of Vol. III of the Proceedings. A separate edition of 1000 copies was printed with the title, "Report on the Condition and Progress of the Davenport Academy during 1878," and has been distributed, as far as they would go, among the corresponding members and principal donors to the Academy. In addition to the regular publications above mentioned, eight photographic negatives have been prepared illustrating several carved animal pipes and other archaeological objects. The total receipts on the publication account, including loans and advancements, have been \$1040.30, and expenditures \$983.54, leaving a balance on hand of \$56.76.

The RECORDING SECRETARY, Mr. C. E. Harrison, reported that during the year there were held ten regular and two special or adjourned meetings of the Academy, with an average attendance of fifteen; and eight meetings of the Trustees, with an average attendance of nine.

The LIBRARIAN, Dr. R. J. Farquharson, reported 2818 additions to the Library during the year 1879, making a grand total of 4000 [counting all pamphlets, etc.], a great advance upon the number of books on Jan. 1st, 1876, which was 118.

The CURATOR, Mr. W. H. Pratt, reported that the increase in size and value of the collections since his last annual report was greater than during any previous year, consisting of contributions from over 100 individuals, the greater portion, however, being presented by four or five persons. In the archaeological department there have been acquired 3,000 flint implements, 75 stone implements, 9 vessels of pottery, 4 carved stone pipes and one copper implement. The additions in geology and paleontology have not been large, but some-

thing has been gained in the number of species represented and in their classification and arrangement. In mineralogy, the beautiful cabinet of 1,500 fine specimens bequeathed by the late Mr. Doe, of Maquoketa, with the collection left by a former Academician, Mr. True, and contributions from many others, more than doubled the former collection in this department, which is made highly attractive and very valuable. In ethnology, six mound builders' skulls and six skulls of Sioux Indians, and other interesting osteological specimens, have been added. The department of zoology is the Academy's weakest point; 600 species of land, marine and fresh water shells have been received, making the entire collection of shells number 1700 species. A few animals suitable for mounting, and two cases of stuffed birds, and some very interesting crustacea in alcohol have been received. The art collection has been much enriched by the addition of several fine pictures presented by Mr. Chas. Viele, Mr. and Mrs. J. M. Parker and others, and there has been considerable gain in historical relics.

The TREASURER, Mr. H. C. Fulton, reported that the total receipts of the general fund were \$453.60, and the expenditures \$691.24, making a deficiency of \$237.64, which amount is mainly accounted for by the item of \$190.00 paid for interest. On the Building or Endowment fund there had been received from all sources \$320.45, and expended \$100.95, leaving a balance of \$219.50. On the Ladies' special fund the receipts were \$120.93 and the expenditures \$18.00, leaving a balance of \$42.93 on hand. [The deficiency in the General fund was met by payments from the Endowment and Ladies' special funds, leaving a net balance on hand of \$24.79.]

Mr. W. C. Putnam, SECRETARY of the HISTORICAL SECTION, presented the following report :

To the President of the Davenport Academy of Natural Sciences :

I have the honor to make the following report of the work of the Historical Section of the Academy during the past year :

There have been but two regular meetings of the Section, one in January and one December. At each of these there were interesting discussions among the few present : at the first meeting upon the early times in this vicinity, and at the last upon the history of the schools of Davenport. No historical essays have been presented by any of the members.

While there has thus been but little of the regular work of societies of this kind accomplished during the year just closed, still we may congratulate ourselves that, since so little interest has been manifested, we have been able to do as much as we have in other directions. Many donations and exchanges have been received for our museum and library. The most important of these are the desk, with the pistol and other articles, of the late Antoine LeClaire, and over one thousand of his manuscript papers, many of them of the greatest value and importance in illustrating the early history of this region, and quite a number of old French papers of great interest. It is out of such material as this that the historian weaves his interesting narrative, and the value of these old manuscript collections cannot be too deeply appreciated. There have been deposited in the library of the Section files of New York papers published during the late war, and twenty-two volumes of the Davenport Gazette from its commencement. Next in order to collections of manuscripts, newspaper files are of great utility as historical material.

But by far the most important work of this past year was the series of meetings of the old settlers of this county, held during the spring and summer at the Academy. As a result of these meetings and of circulars sent among the pioneer settlers still living, a large number of letters giving interesting narratives of early days have been sent to the President of the Section; others have been promised, and when the whole series is completed, it will form a store-house filled with information which must otherwise have been lost.

Hoping that the future will bring forth better fruits than the past, and that the spark of life which the Section now has may not only not be allowed to expire, but that it may be fanned into a flame, I close this brief record of a year's work, which, to say the least, should have presented a better showing.

President's Annual Address.

BY MRS. MARY L. D. PUTNAM.

GENTLEMEN AND LADIES: When at your last annual meeting the sex, of which I am an humble representative, was honored by the selection of myself as your President, my nomination was preceded by the statement from one of your most esteemed members, that "the actual success and present prosperity of the Academy had been coincident with the interest taken in it by woman. It was a Woman's

Centennial Association that first inaugurated and successfully carried out the publication of the proceedings, on which, more than any other one thing, the scientific character and standing of the Academy abroad has been firmly established. The very ground beneath our feet is the spontaneous gift of a generous woman, and this commodious building which affords us a permanent home, from lowest foundation stone to the highest roof crest, if not the direct work of woman's hand, has been wrought out and completed under the inspiring influence of a woman's heart."

These generous words and the hearty action of the Academy in accepting them, overcame the reluctance I naturally felt in assuming a position so exalted as to become the first female president of an academy of natural sciences. The circumstances were peculiar and embarrassing, but in gratefully accepting the position as a tribute to my sex, I had hoped and expected to make up for any lack of scientific qualifications by zeal and enthusiasm in behalf of your great work, and if the performance has fallen short of the promise, you will, I am sure, attribute my shortcomings to the dark experiences through whose shadows I have been passing.

The constitution of your Academy makes it the duty of the Board of Trustees at the annual meeting to make a written report of their proceedings. The by-laws devolve this duty upon the President, and in compliance with this requirement I will now submit to you a brief statement of the progress and condition of the Academy during the past year, (1879,) referring you to the very full and complete reports of the various officers for the details.

The objects of the Academy, as aptly expressed in the Constitution, are "the increase and diffusion of a knowledge of the natural sciences by the establishment of a museum, the reading and publication of original papers and other suitable means." In reporting the progress of the Academy during the year, the most important question to be answered is, What has been done to promote these objects? Under the first head, "the *increase* of a knowledge of the natural sciences," the following papers, embodying the results of original investigations, have been presented:

By J. D. Putnam, Notes on the habits of Cicadas; by W. C. Holbrook, Antiquities of Whiteside county, Ill.; by Prof. G. Seyffarth, Inscriptions on the Davenport Tablets; by Prof. E. L. Berthoud, Explorations in Idaho and Montana in 1878; by Dr. W. J. Hoffman, Antiquities of New Mexico and Arizona; by W. H.

Pratt, The Elephant Pipe, Inscribed Rock at Sterling, Ill., Exploration of Mounds at Albany, Ill. and on Allen Farm, and Lightning Phenomena at Blackhawk.

Of investigations still in progress I may mention that Dr. Parry has been engaged most of the year in arranging his Mexican collections made in 1878. This contains more than 1000 species of plants, of which about 10 per cent. are undescribed. These have been placed in the hands of eminent botanical specialists in America and Europe for study. Capt. W. P. Hall has increased his collections of archaeological relics in the South—the past year in Tennessee—thus laying a solid foundation for the study of the archaeology of the Mississippi Valley. Messrs. Gass, Pratt, Farkuharson and Lindley have continued the exploration and study of mounds in this vicinity. Messrs. Barris and Pratt have made large collections of fossils, among which are a number of new species. Mr. J. D. Putnam has continued, as far as other duties would permit, his studies of the Coccidae and Solpugidae, including a complete revision of his paper on the maple bark lice, the printing of which is just completed.

It would be a strong incentive to original investigations if the Proceedings of the Academy could be issued more promptly than has hitherto been done. It is by the amount and quality of its *original work* that such a society as ours takes its rank as a permanent benefactor to mankind, even though much of it seems a useless waste of energy to the ordinary man of the world.

Under the second head, “the *diffusion* of a knowledge of the natural sciences,” thirteen general and five section meetings have been held, before which the above mentioned papers have been read, and numerous verbal remarks and reports made. Besides the papers read at the meetings, lectures of a more popular nature have been given under the auspices of the Academy, by W. M. D. French, of Chicago, on the “Principles of Art;” by Dr. W. W. Grant on the “Philosophy of Locke;” by Mr. W. O. Gronen on “Lilies and their Culture,” and by Mrs. E. H. Walworth on “Art as a Fashion.” A series of familiar Saturday afternoon talks have been given by Mr. C. T. Lindley, on “Corals” and on “Sea Urchins;” by W. H. Pratt, on “Mound Builders” and on “Teeth;” by Dr. E. H. Hazen, on “Lenses,” and by Dr. C. C. Parry, on Mexican Botany. A class of practical botany, under the direction of Dr. Parry, in the early part of the season, elicited considerable

enthusiasm and held out a promise of continued interest, which, on account of unavoidable interruptions, was only partly realized. The familiar lectures and classes have been established with a view to secure the interest and coöperation of the teachers and pupils of our city schools. If the results in this direction have not as yet proved all that could be desired, or reasonably expected, it is still a matter of congratulation that at least some earnest efforts have been made to place the Academy on its legitimate basis as an educational institution.

By far the most important means of diffusing a knowledge of the natural sciences is the publication of the Proceedings of the Academy. During the year, 64 pages of Vol. III, containing the reports presented at the annual meeting Jan. 1st, 1879, have been printed and partly distributed. By a number of unforeseen hindrances, mainly in the matter of necessary illustrations and the loss of engraved plates by the inexperience of the printer, the publication of Vol. II has been delayed beyond expectation, but it is now hoped that it will be finally completed and issued soon after the present annual meeting. The enlarged scope given to this volume has exposed its editor, Mr. J. D. Putnam, to much extra labor and expense, which it is no more than simple justice should be reasonably shared by other members of the Academy who are equally interested in an enterprise which has given character and reputation to the Academy abroad, as well as adding to the library in the way of exchanges, what in a pecuniary point of view is worth at least double its actual cost.

Other important instruments, both in the increase and in the diffusion of knowledge, are the Library and Museum. The increase of the Library has been greater than in any previous year, the records of the Corresponding Secretary showing a total of 2,818 additions of all kinds, all either donated or received in exchange. The Academy is in regular receipt of many of the more important scientific serial publications of both America and Europe, being in active correspondence with nearly 400 of the principal scientific institutions throughout the world, which send their publications in exchange. During the year, the books have been moved into the room formerly occupied by the Art Association, which forms an excellent library and reading room. A large proportion of the books are still in their original paper covers. These could be rendered much more useful for study by being properly bound. The

number of *volumes* contained in the Library at the present time cannot be definitely stated, but it is estimated that there are over 2000.

In the Museum, likewise, the increase of the collections in value and extent is greater than during any previous year. A fine mineralogical collection, bequeathed by the late George W. Doe, of Maquoketa; a collection of minerals made by our former Trustee, Mr. D. S. True, and given by his widow, Mrs. J. T. Miner; a fine collection of shells from Dr. Wesley Newcomb, of Ithaca, N. Y.; a collection of 1000 species—4000 specimens—of insects, from Mr. L. Lethierry, of Lille, France, and smaller donations from more than 100 persons, merit more than a passing allusion. For further particulars, I must refer you to the detailed report of the Curator. A fact worthy of notice is the number of valuable donations received from abroad, another direct result of the publications of the Academy. These collections have all been received and labeled, and, as far as practicable, with our limited number of cases, arranged for exhibition by our Curator, Mr. W. H. Pratt. Such large additions have necessarily devolved upon this efficient officer much arduous labor, which, being so far gratuitously performed, places the Academy under special obligations, which should be at least acknowledged. The time appears to be rapidly approaching when it will be impossible for one man, dependent upon his daily labor for his support, to do all this work in his leisure hours. Even were no question of right and justice involved, to continue to depend upon such gratuitous labor would of necessity eventually require a suspension of this work of museum arrangement and display, or its reasonable remuneration. I would suggest that in the meantime we have among our members a volunteer corps to assist the Curator by taking charge of one or more special departments of the collection, receiving, labeling and arranging the specimens pertaining thereto. This has already been done with the Botanical and Entomological collections, which have been under the care of Dr. C. C. Parry and J. D. Putnam, respectively.

Previous to July 30th, the Museum and Library were open to all visitors free of charge, every day except Sunday. At this date it was decided to charge an admission fee of ten cents to adults and five cents to children, so as to more fully meet the necessary expenses of keeping the building open. The result of this move, much to the surprise of the officers, was a perceptible increase in

the number of visitors. The total number of visitors (including members and employes) from July 30th to Jan. 5th was 3,169, indicating about 7,000 for the year.

Supplementing the scientific work of the Academy are its Biological, Geological and Archaeological Sections. The first two have been very quiet during the year, but are in constant expectation of resuming their accustomed vitality. The Archaeological Section has been more active, and has held a number of interesting meetings.

Complementing the scientific objects of the Academy is the work of the Historical Section. Much activity and enthusiasm has been manifested by a few members, and although but two regular meetings have been held, much important work has been accomplished, and many valuable donations received. A series of meetings of the old settlers held at the Academy during the year, at which a large number of letters giving interesting narratives of early days were presented, is worthy of special mention.

The Corresponding Secretary reports 575 letters received and 454 written, all of which have been filed or copied and recorded. While most of the letters have been acknowledgments of publications, sent and received, many others have been filled with scientific information of much interest and value. A copy of the report of the last annual meeting has been sent to all corresponding members, and to most of the donors to the Library and Museum. A total of 758 publications of all issues have been distributed. All donations and exchanges for the Library have been received, recorded and stamped by the Corresponding Secretary, the whole number of pieces amounting to 2,818. During a portion of the year these were promptly acknowledged, but the want of funds for postage has forced a curtailment of expenses. A list of all letters received and written since the foundation of the Academy (2752 received, 1685 written), was commenced, and, with the assistance of Miss Mary A. Finley, of Champaign, Ill., is nearly completed.

During the year, 13 regular, 29 corresponding and one honorary member have been elected, making the present number of members enrolled, as follows: 95 regular members in good standing, 58 life members, 243 corresponding and 7 honorary members.

We mourn the loss of two of our most worthy life members—B. B. Woodward and John C. Putnam, and one corresponding member, Dr. Asa Fitch,—who have died during the year.

The business affairs, as usual, have been managed by the Trustees, who have held eight meetings during the year, at which the various bills and accounts reported by the Treasurer, have been presented and passed upon. For the details of receipts and expenditures I must refer you to the reports of the Treasurer and Finance Committee. On April 1st, \$1000 of the debt was refunded at 8%, thus making a saving of \$20 a year in interest. An ineffectual effort was made to raise \$500 in order to pay the balance of the building debt. An additional indebtedness of \$239.90 has been incurred in order to pay for the printing of the annual report. Several entertainments were given early in the year without any marked success, with the exception of a children's entertainment, on Feb. 22nd, which netted \$16.50. The small admission fee charged since July 30th has yielded an amount sufficient to pay the janitor. Although the debt has been slightly increased rather than diminished, the amount of interest we have to pay is less. It would have given me great pleasure to have seen the debt reduced to \$1000, but the circumstances of the year have been such as to render this result impossible.

The reports read before you this evening show that a great work has already been accomplished by this Academy, and reveal the infinite possibilities yet before it, when a more general interest throughout this community shall give us enlarged resources for research and exploration.

It is a beautiful commentary upon human nature that an institution in no way appealing to the almighty dollar has rapidly risen to such a degree of prominence and prosperity as to attract the attention of the scientific men of every land. The publications of the Academy have been sent to the scientific societies of this and other countries, and have been received everywhere with commendation. This has resulted in large additions to the Library and extensive contributions to the Museum. These great results are mainly due to the untiring energy, the self-denying zeal and unremunerative service of its few enthusiastic members.

In now retiring from this honorable position, I desire to express to you my thanks for the uniform courtesy and consideration extended to me, and to assure you that in the more private station to which I gladly retire, I shall not lose my zeal nor interest in the Academy, and shall continue my active exertions in behalf of your noble work.

The following officers were elected for the ensuing year :

President—W. H. PRATT.

First Vice President—C. C. PARRY.

Second Vice President—E. P. LYNCH.

Recording Secretary—Miss LUCY PRATT.

Corresponding Secretary—J. D. PUTNAM.

Treasurer—CHARLES E. PUTNAM.

Librarian—C. T. LINDLEY.

Curator—W. O. GRONEN.

Trustees for three years—E. P. LYNCH, C. H. PRESTON, M. B. COCHRAN, R. D. MYERS.

Trustee for one year (to fill vacancy)—H. C. FULTON.

JANUARY 9TH, 1880. — HISTORICAL SECTION.

Mr. J. A. Crandall in the chair. Two persons present.

The discussion of the early schools of Davenport was continued.

A brief account of the first school opened here, which was taught by Miss Hall, was sent in by Mr. C. H. Eldridge, who was one of her pupils. This school was in a log building built for a blacksmith shop, and was situated on Front street, west of Ripley.

JANUARY 16TH, 1880. — ARCHEOLOGICAL SECTION.

Mr. W. H. Pratt in the chair. Seven members present.

The evening was spent in classifying the various forms of flint and stone implements in the collection of the Academy, and discussing the proper names for each.

JANUARY 23D, 1880. — GEOLOGICAL SECTION.

Prof. W. H. Barris in the chair. Five members present.

The Section was reorganized by the election of Prof. W. H. Barris as President and Ja Goldsbury as Secretary.

Mr. Gronen presented some fine fossils from the Niagara formation at Grafton, Ill.

The following paper was presented :

[Proc. D. A. N. S., Vol. III.]

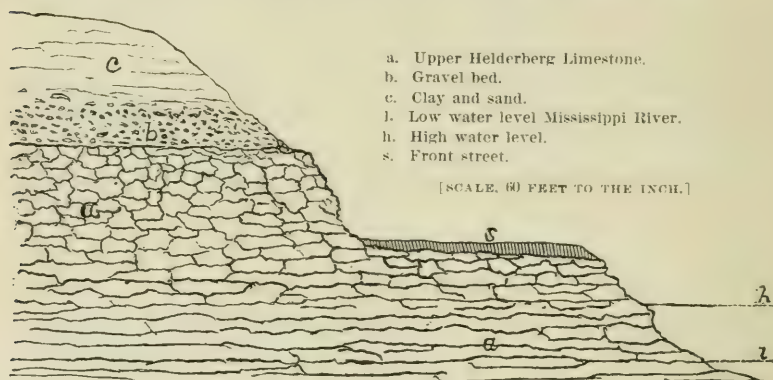
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[April 1, 1881.]

Geological Section of the Bluff at East Davenport.

BY W. H. PRATT.

At the foot of Mississippi avenue, East Davenport, the street excavations and quarrying have exposed a section which has attracted some attention, especially on account of the fossils found there.



The hard non-fossiliferous Upper Helderberg limestone, (a) which there forms the river bed, extends upward to a height of about 65 feet above low water mark.

Front street passes this point on a terrace of this rock, covered by three or four feet of soil, at the height of 37 feet above the same line, and the top of the ledge is 25 or 30 feet higher.

The upper portion of the rock is much broken, containing water-worn cavities and crevices filled with clay and sand, but lower down it is more solid and regular, exhibiting, however, scarcely any seams to facilitate the quarrying.

Immediately overlying this rock (the upper surface of which is uneven) is a bed of gravel (b) of perhaps an average thickness of eight or ten feet, and over this a mixture of sand and clay, (c) the lower part being more sandy and the upper more clayey, to the depth of 30 to 40 feet, forming a ridge extending thus abruptly toward the the river (southward) and sloping off at a short distance both east and west.

The upper surface of the gravel bed is not well defined but considerably intermingled with the clay and interstratified in small beds. The gravel drift contains a considerable variety of carboniferous fossils, of which we have identified the following, viz :

<i>Productus punctatus</i> , Martin.	<i>Bellerophon</i> , sp.
<i>Productus prattenianus</i> , Norwood.	<i>Euomphulus</i> , sp.
<i>Hemipronites crassus</i> , Meek & Hayden	<i>Orthoceras</i> , sp.
<i>Spirifer opimus</i> , Hall.	<i>Phillipsia</i> , sp.
<i>Athyris subtilita</i> , Hall.	

No traces of corals have been met with. The fossils consist of very sharp silicified casts and impressions in small stones of but few ounces weight, many of which appear to be somewhat water-worn, and often exhibiting a concretionary structure. These stones are brown on the outside, and of a light brown, cream or white color within, often partially of a porous chalky appearance.

Associated with them are numerous nodules of partially translucent finely granular quartz. In the latter no fossils ever occur.

JANUARY 29TH, 1880. — REGULAR MEETING.

The President, W. H. Pratt, in the chair. Eleven persons present.

Messrs. D. R. Lillibridge and Noyes B. Miner were elected regular members. Dr. Shipp, Shipp's Landing, Tenn., was elected a corresponding member.

The President announced the following **STANDING COMMITTEES** for the year:

Finance—C. E. Putnam, H. C. Fulton, R. D. Myers.

Publication—J. D. Putnam, C. C. Parry, W. H. Barris, R. J. Farquharson, C. H. Preston.

Library—C. T. Lindley, R. J. Farquharson, C. H. Preston, Miss Lucy Pratt.

Museum—W. O. Gronen, J. D. Putnam, C. C. Parry, J. Gass, W. H. Barris, C. E. Harrison, D. S. Sheldon, Wm. Riepe, W. H. Pratt.

Furnishing—E. H. Hazen, E. P. Lynch, W. F. Ross.

Entertainments—Mrs. Mary L. D. Putnam, Mrs. J. B. Young, Mrs. E. M. Pratt, Mrs. W. O. Gronen, C. E. Harrison, C. T. Lindley.

Lectures—C. C. Parry, S. S. Hunting, R. D. Myers, Mrs. Mary L. D. Putnam.

Committee on Familiar Lessons—C. T. Lindley, C. H. Preston, C. C. Parry, J. D. Putnam, W. H. Pratt.

Committee on Cutting and Polishing Machines—C. E. Harrison, E. P. Lynch.

Committee on Chemical Apparatus—C. H. Preston.

Mr. Pratt exhibited a carved stone pipe of the regular mound builder's type, but representing a human head surmounted by a rather elaborately ornamented cap. It was found in Warren county, Mo., and was obtained by Mr. Gass for examination and exhibition.

The following paper was read :

Remarks on the Antiquities of New Mexico and Arizona.

BY W. J. HOFFMAN, M. D.

Of the several theories advanced regarding the origin of the modern Pueblo Indians of New Mexico and Arizona, the one more generally accepted, probably from lack of evidence to the contrary, is, that they are the descendants of that race who built and occupied the now ruined communal dwellings and cliff houses scattered over an area embracing more than thirty thousand square miles. Although in entertaining this view we must not lose sight of the discordant characteristics existing between the ancient and modern plans of architecture, which, upon close examination and comparison, appear to have been the result of necessity rather than of choice; and in presenting the facts, it may be well also to refer to the names by which we recognize these people of remote times, as they existed during the different periods of prosperity and misfortune.

The generic term "Pueblo"* has been adopted on account of their manner of living in community dwellings; with the specific word "ancient," applying to the builders of the ruined structures, while the term "modern" is retained for the present inhabitants. The "cliff-dwellers," so-called for want of a more appropriate name, formed that branch of the ancient Pueblos who constructed the cliff-dwellings for greater security against the hostile influences with which they appear to have been surrounded.

The oldest remains (of which there are some magnificent examples) include those of rectangular form, having terraced dwellings upon three sides, while the fourth—usually one of the longer ones—is filled up with lower structures, or stone walls, in which the latter sometimes deviate from a straight line. The two exceptions to the rectangular type are Pueblo Peñasca Blanca and Pueblo Bonito of the Chaco Cañon group, in both of which the habitable portions are semi-circular, the remaining continuation forming an oval, as in the former, and a straight line in the latter. In all, however, the structures were amphitheatral, *i.e.*,

* Signifies town, village; population, people.

terraced from within outward, thus forming an inner court and causing the outer wall to be the highest, forming an effectual defense against surprise. On the contrary, we find the Pueblos of the modern Indians to be constructed in pyramidal form, the roof of the outer row of buildings being the lowest, forming the pavement for the second series, and so on upward to the most elevated point, so that, were it possible to invert one type over the other, they would almost fit. The *estufas*, or council rooms connected with the ancient buildings, are circular, while the modern ones are rectangular, with several exceptions,* which appear to have been ancient ones, but refitted so as to save the labor of digging, as they had been built underground in accordance with the custom of that period.

The exactitude and neatness displayed in constructing walls, or sections of walls, with very small slabs of stone, is marvelous,† and this skill is detected in some of the better class of cliff-dwellings, where the foundations were based upon the smooth sloping rock as securely as if it formed part of the rock itself.

In many localities these primitive structures have become nearly entirely obliterated, presenting here and there but a heap of rubbish, fragments of pottery, or an occasional dressed stone. That the inhabitants of these communal dwellings were disturbed by some external hostile influence seems probable from the fact that they were obliged to desert them for places of greater security elsewhere. In some of the best preserved Pueblos we find vessels and other household utensils in such excellent condition as would scarcely be the case had a voluntary departure been made therefrom. Of what nation the enemy was composed, or from what direction the invasion, is unanswerable from our present state of information: though, that the main point of attack was from the south seems evident from the fact that the cliff-remains are nearly all northward of the respective groups of pueblos to which they are most conveniently located.

The cliff-remains consist of large dwellings, fortresses and cave-houses; watch towers and circular enclosures, usually situated upon the summit of the cliffs, and semi-circular walls, the two termini of which run out to the edge of the escarpment and directly over the dwellings, affording communication with the level country above. That the distance from the buildings to the summit, or to the valleys

* At Santo Domingo, N. M.

† For illustrations of this see Mr. W. H. Jackson's Report in the Tenth Ann. Rep. U. S. Geol. and Geog. Survey Terr. for 1876.

below, is greater than could have been reached by the most ingenious contrivance made of wood is apparent, and it would be impossible to know definitely how their mode of communication was carried on but for the discovery of some pieces of rope and cords made of the fibre of the *Yucca* (*sp.*?) and in several instances the remains of notches cut into the sloping rock below.

Agriculture was carried on, as we learn from the discovery of charred corn, as well as the ears, and also from the existence of large irrigating canals along the ridges flanking extensive valleys over which lie scattered hundreds of little hillocks, consisting of hard clay containing a sprinkling of broken pottery, which, no doubt, mark the sites of the temporary habitations of the agriculturalists. These settlements are found in favorable localities in close proximity to the cliff-dwellings, which formed their mutual resort for defense.

The face of a continuous escarpment filled with little houses as they exist in the Verde valley, containing but one or two openings each, present an appearance resembling the deserted nests of a colony of cliff-swallows rather than the abode of human beings.

One of the most singular selections for such buildings is a large circular depression known as Montezuma's Well, eight miles northeast of Camp Verde, A. T. For miles below, the valley of Beaver Creek contains the remnants of what was once a flourishing settlement, although the ruins all appear to have belonged to the cliff-dwellers, the Well forming the northern terminus of the series. This depression, or Well, is several hundred feet in diameter, about seventy feet deep, with vertical walls exposing horizontal strata of limestone, while about one-half of the bottom is covered with water, no bottom being reached with a seventy foot line. There is a border of debris lying around the base of the wall, over which there is a tolerable growth of cottonwood and sycamore trees, with an occasional cluster of grass and reeds along the shore line. A narrow tunnel was discovered at the base of the eastern wall, leading irregularly out to the bank of Beaver Creek, a total distance of about fifty feet. The excavation, forming what has been termed the Well, was undoubtedly formed through the solution of the limestone by the carbonic acid with which the water was charged, the tunnel at one time forming the outlet. The flow of water had ceased, no doubt, and was stationary as it is now, when the "ancient" people conceived the idea of building their temporary habitations in the niches and cavities in the face of the wall, the remains of which are still visible, and, in several instances, in excel-

lent preservation. The oblong form of the Well, allowed the buildings to nearly face the center, thus affording an admirable prospect for the aboriginal gossip.

There is but a single path leading down to the bottom of the well, just broad enough to permit the descent of one individual at a time, passing between two small dwellings, each large enough to hold three or four persons comfortably, for the defense of this point. That the buildings were used for this purpose is apparent from the fact that each contains but one small window, facing the path, but about six or eight feet distant, the door being in the next wall, facing the opposite side of the Well, and only accessible by crawling along a narrow ledge.

One of the most interesting features existing in connection with many of the ruins is the excellent preservation of the wooden rafters and lintels. These consist mainly of cedar, and frequently bear the marks of the builder's stone axe; but when we consider the sheltered positions of the preserved specimens,* as well as the meager rainfall and extraordinarily dry atmosphere, this may be accounted for. We find the same to exist in exactly a like condition in the buried city of the Desert of Gobi, western China, which, on account of the encroachment of the sand was deserted already as early as the ninth century.

With our present state of information, no conclusions can be formed regarding the time of the occupation of these cliff-remains. The subject is just beginning to receive that attention and investigation necessary for the accumulation of all attainable facts, which, when once collected and classified, will present the history without further speculation. Although there appears to be an absence of traditions relating directly to the predecessors of the present inhabitants, there is but little doubt that some dimmed historic facts will yet be brought to light when the mythology is studied, a field than which no richer one is to be found among any aboriginal tribes.

It is evident that the cliff-dwellings were deserted upon the removal of that danger which compelled their previous construction, though many of them are not as old as is generally supposed. According to Vargas, the Pueblo of Hungo-Pavi was inhabited in the latter part of the 17th century. That pueblo is now in ruins, and forms one of the grand series in the Cañon of the Chaco, N. M., of

* In one of the cliff-dwellings, where the overhanging ledge projected sufficiently to prevent the entrance of rain, the accumulation of mortar, or plaster, and owl's dung amounted to over two feet in depth.

which, also, Pueblo Bonito is one, to which reference is made elsewhere.*

That a greater number of years has elapsed since the occupation of some of the ruined buildings is apparent in the physical features of the surrounding areas. The geological formations are of such a character as ordinarily support forests, and the presence of large dry water courses filled with sand, gravel, and round water-worn boulders, furnish evidence of a once well-watered region. With the disappearance of the forests, whether from fires, aided by the requirements of the people for architecture and fuel, or from other causes, the rainfall has decreased in proportion, so that little water, if any, remains in the cañons and valleys for any length of time, even after the most favorable season; and it is a fact well known, that since our first knowledge of the country, various sections of it have been undergoing a gradual process of desiccation. Extensive ruins occur at localities which are at this day fifty miles from the nearest spring, and in which the intervening water courses have become the bed of a growth of timber.

The modern Pueblo Indians appear to have no knowledge of the builders of the ruined dwellings with which they are surrounded, and since the earliest reports, the modern communities seem to have altered but little, though allowing their dwellings to present every indication of decay and neglect.†

*Vargas names the Pueblo of La Cieneguilla. It is supposed to be between Santo Domingo and Santa Fé. Ruins exist in the cañon of the river of Santa Fé, and these may be the remains of La Cieneguia, as it is sometimes spelled. Augustin Ruiz visited *Puara* in 1581, which is situated above Tegua (on the river). It is about eight miles above Albuquerque on the Del Norte, but it is long since in ruins. The Pueblo of the Galesteo, a village of the Tanos nation, [*sic*] is now also in ruins. This is situated two miles south of Santa Fé. [Extracted from Davis' Conquest of New Mexico. 1869.]

†It may be well to state in this connection that the Pimas have in several instances been named as being closely connected with the Pueblos on account of their comparative advancement in constructing their habitations. In this respect there is no similarity whatever, rather comparing with the former mode of building of the Mandans. In conversation with Dr. Willis De Haas upon this subject a short time since, he stated that the circular heaps of earth indicating the former site of a Pima house had been the means of suggesting the idea that the Mound Builders' remains (of a similar character though more extensive) in the Ohio Valley had once supported the habitations of the latter. In a communication from Dr. De Haas, dated Dec. 23d, 1879, he says, "Mr. Lewis H. Morgan (in a paper read before the National Acad. of Sci., April, 1876, and *N. A. Review*, July, 1876,) maintains that the mural works west and south were constructed for the support of houses; that the Mound Builders were Village Indians; that they lived in communities like the Pueblos and other southwest tribes. The article pub-

Then again, the discovery of human remains and relics of art, found at varying depths in the soil, present every indication of considerable age.

The most interesting discovery is that of a skull found several years since in the Chaco Cañon, N. M., fourteen feet below the surface.* The cañon is about 500 yards broad at the point under consideration, the bed consisting of alluvium. Ten large ruined pueblos are located in the valley occupying about ten miles from first to last. At the time of building there was a stream of water which has since disappeared, but has left a narrow deep channel, varying from six to sixteen feet in depth, exposing to view the horizontal strata of alluvial deposits composing the soil. Nearly opposite Pueblo Bonito the cut has exposed a stratum of gravel and broken pottery in which the skull was found. On the opposite side of the gorge, and above the

lished in the *Review* is illustrated by cuts, showing how the houses might have been constructed, &c. 'Upon the crests of the walls were the sites of the houses.' He manifestly refers to the dwelling-places of the Pimos, Mandans, &c., and assumes that the Mound Builders constructed their mural works for identically similar purposes. He further maintains 'that the tribes who constructed the earthworks of the Ohio Valley were American Indians; no other assumption is tenable.' He refers to them as 'Village Indians,' and his fanciful picture of a restored village is odd enough."

"He describes the readiness with which a communal dwelling could be built—by inclining poles against the sides and securing them at the top. The house is divided into several rooms, to suit their communal customs; these apartments are occupied by separate families; a space for fire is arranged at intervals in a hall running the entire length, to accommodate the necessities of four apartments."

"In answer to this fallacious theory, it may be only necessary to say that, if true, we should be able to find at intervals in the embankments ashes, charcoal, kitchen refuse, etc. Not a single instance is upon record of such discovery where walls have been carefully taken down for economic uses, as at Marietta, Circleville, Columbus and elsewhere, where the material was used in manufacturing brick, &c. In some places the earthworks had been used for burial purposes, as at Fort Ancient."

The circular dwellings of the Pimas frequently, and as far as my personal observation extended, generally had an embankment of earth and sand piled around and against them, to strengthen the fundamental support, and to prevent the water from entering during rains, thus acting as a barrier. Should one of these houses be in any way destroyed, what would indicate its former existence? Nothing but a circular embankment, though less in extent than most of those of the Ohio Valley; but in them would exist the remains of a hearth, its accompaniment of charcoal, ashes, broken pottery, etc., etc. The same thing, on a still smaller scale, can be seen after the destruction of a hut belonging to a miner, or a charcoal burner; instances being common where mud and turf has been piled against the outside walls as high as the roof, and examples of which can be seen in a settlement of railroad builders most any time.

* Described and figured by the writer in the Tenth Ann. Rep. U. S. Geol. and Geog. Survey of the Terr. for 1876.

horizon of this stratum, are brought to view the remains of stone walls of older ruins, which terminate within four feet of the surface and are covered by undisturbed layers of sand as deposited by the periodical overflow; over all this now stands the long since deserted ruin of the pueblo above named.

Human remains were discovered by Mr. Chittenden*—late of Prof. Hayden's Survey—in the Hoven Weep, Colorado, four feet below the surface. Two other skeletons were also found near Abiquiu, N. M., twenty or thirty feet from an old ruin near the place where Dr. Yarrow made his discoveries. From recent information I learn of the existence of an ancient burial ground two miles from Camp Verde, A. T., near the site of my investigations in 1871. Capt. Brayton, U. S. A., stationed at that post about two years since, who, in making excavations for building stone over the site of an old ruin, found eight or nine partially burned skeletons lying side by side under the debris, their appearance and surroundings rather inducing the belief that they had fallen while defending the building; the supposition being strengthened by the fact that the older race did not practice cremation.

The Rev. Sheldon Jackson informs me that in October, 1878, a Mexican, in establishing a sheep ranch twelve miles north of Azul, N. M., discovered some pottery twelve feet below the surface while digging for water. At the depth named, a protruding shelf of rock was encountered, under which were found several vessels, only one of which escaped being broken by the pick and spade. These were found on the original surface of the soil, and near the site of an old spring which had long since been buried by the soil. The vessel was secured by Mr. Jackson, and is now in the National Museum. It represents a duck, has a capacity of less than a gallon, the opening being in the top of the neck, which is about an inch in diameter in the inside; color dark slate blue, with ornamentations in black, consisting of the usual black lines and serrated markings so common to all the older varieties. In several places there is considerable surface erosion, due to the moisture of the soil in which it lay buried.

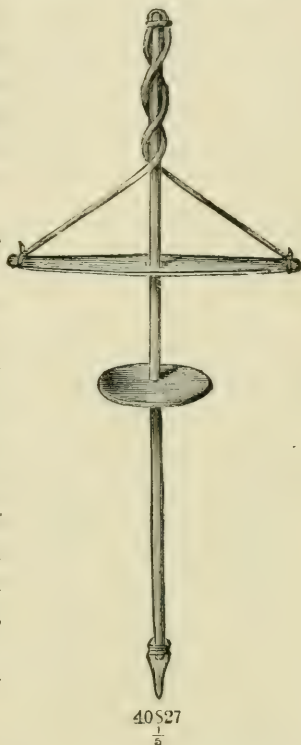
It appears that in former times traffic had been carried on between some of the Pueblos and the Aztecs, but to what extent is not known. The Mexicans, besides employing several other species of *green stones*

* Bull. U. S. Geolog. and Geograph. Survey, II, page 47. See also Rep. Chief of Engineers for 1875, p. 1066.

for ornaments and in the arts, had turquoises, which were, no doubt, obtained from the New Mexican mines, and for which articles of equal value were sent in return.* Amongst the debris of the older ruins we also find several species of marine shells which had been perforated and worked into pendants and for necklaces, indicating previous communication with the Pacific coast.

The turquoise found in New Mexico is usually of a pale bluish-green tint, though small specimens of a finer color sometimes occur. This mineral is still eagerly sought for by the inhabitants of the pueblos located nearest the old mines, and those fit for use are perforated by means of stone tipped drills, an illustration of which is given in Fig. 40827.

A writer in a recent number of the *Rocky Mountain Presbyterian* says "the Moqui received that name in 1855 on account of the ravages⁷ caused by an epidemic of small-pox which carried off nearly two-thirds of the population, this name being given them by their neighbors because it means *death*." The Aztec *miqui* signifies the same² thing, and it is evident that the name was applied at a much earlier period, if applied at all, as Vargas, whose expedition set out for this region in 1692, employs the word Moqui in his narrative.

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* Coronado says of the Pueblos, "they have no cotton-wool growing, because the country is too cold, yet they wear mantles thereof, and true it is that there was found within their houses certain yarn made of cotton-wool." The payment of turquoises to Mexico is mentioned by Clavigero (Cullen's trans.) I, 351.

For further information regarding the green-stones used by the nation referred to, see article entitled "The Chalchihuitl of the Ancient Mexicans: its Locality and Association and its Identity with Turquoise." By W. P. Blake. *Am. Jour. Sci. Arts.* XXV (2d ser.) 1858, pp. 227-232. Also, "Observations on the Chalchihuitl of Mexico and Central America." E. G. Squier. *Ann. Lye. Hist. N. Y.* Vol. IX, 1869, p. 246-265, fig. 1. Mr. Squier doubts if the true chalchihuitl was turquoise, and says that they [the Mexicans] used the stone described by Dr. Blake for certain purposes, for there exists in the museum of the late Mr. Henry Christy in London, a human skull completely encrusted with a

The Pueblo of Acoma is in precisely the same condition as noted three and a half centuries ago, while on the other hand, some towns appear to have since been deserted and in ruins.

As before stated, many of the modern dwellings are terraced from without toward a central elevation, in the form of an oblong truncated pyramid, being in this respect entirely the reverse of the ancient structures. The lower rooms are entered through the roof, which is reached from the outside by means of ladders, thus forming some defense against wild beasts, but no effectual one against the attack of an enemy. It appears from this mode of building, that, if they are the descendants of the cliff-dwellers, and through them of the "Ancient" Pueblos, the cause which led to the construction of fortified dwellings had been removed, and the consequent sense of comparative safety induced them to construct the modern dwellings, of the origin of which—regarding time—we have no historic data.

POTTERY.

In examining the oldest forms of pottery and fragments of vessels, one cannot but be surprised at the existence of glazing in greater or less degree upon the various types of specimens. By far the greater number of fragments bear color ornamentation upon a smooth surface, others being either perfectly plain or ornamented with indented or incised lines. The glazing upon some specimens is very pronounced, which extended investigations and chemical analyses appear to demonstrate was the result of accident rather than design.

Knowing the country to abound in springs and pools of water rather than running streams, and taking into consideration the general alkalinity of such water in this region, resulting from the disintegration of the rocks and the percolation of water through formations containing alkaline matter, and further the concentration of such solutions by evaporation—which is very rapid in this climate—it would be only natural for the natives to employ such water in the manufacture of pottery as would be unfit for any other purposes. Consequently, the water used in producing a plastic condition of the clay, with that ab-

mosaic of precisely this stone, and a flint knife with its handle elaborately inlaid with it, in similar fragments. Various authors give *chalchihuitl*, *chalchihuitl*, or *chalchihuite*. The word *chalchihuitl* is defined by Molina in his *Vocabulario Mexicano* (1571), to signify *Esmeralda baja*, or an inferior kind of emerald. The precious emerald, or emerald proper, was called *quetzalitlitzli*, from *quetzal*—the bird *Trogon resplendens* (the feathers of which served for royal robes), and *itzli*—stone, *i. e.*, the stone of quetzal. The *esmeralda baja* is supposed to be nephrite, as Sahagun avers.

sorbed in smoothing the vessel previous to drying, would contribute sufficient saline matter to produce a visible effect, if the salt had not previously existed in the clay. In addition, it is ascertained that the salt is present in the body of the fragments of pottery as well as in the glazing, thus verifying to some extent the belief already entertained. Another fact which supports the statement is that in several instances glazing was present upon the incised or punctured varieties, and upon close examination was found to exist in the different indentations as well as upon the ordinary untouched surface. The reason that some specimens present more glazing than others, (and this, by the way, generally occurs upon the thickest fragments,) is, on account of the proportionately greater amount of saline matter contained therein, and brought to the surface as an incrustation by evaporation and drying, being thus directly exposed to the heat in baking, and also, perhaps, that these specimens may have received more surface washing to present a more uniform appearance.

Analyses made of a large number of varying specimens support the above proposition, and a few examples are given below, to illustrate the relative proportions of several ingredients that were more particularly sought for.

No. I. From a cliff-dwelling in the cañon of the Rio Mancos.

Physical characters: Compact; inner surface smooth and of a pale bluish or ashy tint; externally, fawn-colored, strongly glazed, the ornamentation consisting of black lines crossing the base lines at right angles. The body of the specimen contains numerous granules of silica and spicules of hornblende. Hardness, 3; sp. gr., 2.372.

<i>Composition:</i> Chlorid of sodium,	.38
Potassa,	.12
Alumina,	.03
Oxide of iron,	.78
Carbonate of lime, silica, etc.,	98.69

Carefully removing the glazed surface from other pieces of the same vessel, the body of the material furnished the following:

Chlorid of sodium,	.26
Potassa,	.13
Alumina,	trace
Oxide of iron,	.76
Carbonate of lime, silica, etc.,	98.85

Small particles of the baked clay were lost by adhering to the glazed scales, if they may be so termed, as that surface was too thin to remove without affecting the material to which it adhered. Natural thickness of the piece, .27 of an inch.

No. II. From the same locality.

Physical characters : Compact; granular; color, dark blue; glazing upon the outer surface not so pronounced as in the preceding, although the inner surface shows it very perceptibly. Decoration upon outer surface consists of pale black serrated lines. Hardness, 3.5. Sp. gr., 2.433.

<i>Composition</i> :	Chlorid of sodium,	.23
	Potassa,	.16
	Alumina,	.08
	Oxide of iron,	.56
	Carbonate of lime, silica, etc.,	98.97

Thickness of specimen, .13 of an inch. In this case the vessel was, according to the pieces, about eight inches high, originally with an opening less than four inches in diameter, and would scarcely present the inner perceptibly glazed surface from intentional design in manufacture, for that were scarcely possible.

No. III. From Santo Domingo.

Physical characters. Rather porous; fawn-colored in middle of specimen, the inner and outer fourths being of a reddish tinge, due to oxidation of iron; no glazing; contains minute granules of silica; colored decorations, brown. Hardness, 2.8; sp. gr., 2.308.

<i>Composition</i> :	Chlorid of sodium,	.24
	Potassa,	.15
	Alumina,	.02
	Oxide of iron,	.15
	Carb. of lime, silica, org. matter, etc.,	99.44

If any glazing was present originally, it was not perceptible at this time, although no indications of wear were noticeable. The coloring matter upon this specimen consisted of carbonate of iron, and it would be interesting to know how long a period was consumed in the change from an oxide. Mortar from a Roman wall was found to contain carbonate of lime, and in another instance a bi-carbonate, the reunion of the carbonic acid with the lime having taken place during the lapse of centuries.* The black lines applied to this pottery are supposed to have consisted of charcoal finely ground and mixed with clay. Iron in the form of an earthy oxide is not of common occurrence in this region, and it may be that the material employed was from the "red ochre mines" mentioned by Vargas as being located in the Cierro Colorado, (Red Mountain). "It is said to be ten days travel from Aguatubi, on a high steep mountain, difficult of access. It required a day or two to go up and get the ochre out of the earth,

* I was recently so informed by Dr. F. M. Endlich of the Smithsonian Institution, who has made analyses of the mortar above stated.

having to descend into a deep hole, and that it was necessary to remain all night without water.”* The narrator never made an expedition to the mines, the reported absence of water probably being the cause of his avoiding the dangers attending such an undertaking.

The ornamentation upon the pottery found about the ancient ruins, differs in design from that produced to-day, or even that style employed before the introduction of European or American ware, which suggested new forms and which has, in several instances, materially modified their primitive artistic taste. Upon the older vessels, straight lines and triangles predominate and form the base of nearly all varieties of decoration, while upon the true modern pottery curved lines are generally the most prominent. There are very decided differences in the decoration of the respective pueblos, which, to one thoroughly acquainted with them, can nearly always be distinguished; an attempt to exhibit this variation without the proper illustrations would be a useless undertaking at this time.

Pottery is manufactured at present by the inhabitants of all the Pueblos but those of Taos and Picuri, excepting in instances where a woman of the manufacturing tribes marries a Taos or Picuri Indian. The ordinary decorated ware is made by numerous tribes, but for the purpose of giving it a better finish, a polishing stone is used, giving the surface of the vessel a glazed appearance after baking. The clay employed in constructing the vessel, when of the proper consistence, is worked with the thumb and fingers, aided with a small wooden trowel or a fragment of pottery to shape the ware until of the intended proportions and shape. The vessel is then sun-dried, after which the ornamentation is applied, when it is baked. The Indians of the Moqui Pueblos, as well as those of Zuñi, Acoma, Laguna, Jemez, Silla and Santa Ana, do not employ polishing stones, but paint the pottery in various styles of decoration, each general type presenting sub-types characteristic of certain families or clans which are always recognizable by one intimately acquainted with them.†

* Quoted at second hand from “Davis’ Conq. of N. Mex.” 1869.

† I am indebted to Col. James Stevenson for information regarding the present mode of manufacture of pottery by these Indians. During the past two seasons he has made a thorough study of the arts and home life of the aborigines of New Mexico, his collections now ready for permanent exhibition in the National Museum comprising 4,500 specimens of pottery, representing all imaginable forms, sizes and styles of decorations; also, about 3,000 archaeological specimens of stone, wood and bone, 50 musical instruments, 150 articles of clothing, about 40 varieties of paints, earths and other

The black ware, first brought to the National Museum by Col. Stevenson, is made by the Indians of the Pueblos of San Juan, Santa Clara, San Ildefonso, Cochiti, Tesuque, Nambe, Santo Domingo, Sandia and San Felipe. The vessels are constructed in the ordinary manner and sun-dried. A paste of clay is then made, of the consistence of cream, and applied with a mop or brush of goat's hair or sheep's wool, which is then rubbed dry with the polishing stone. The vessel is next placed upon the ground, and a pile of dry manure built over it in contact with the specimen, appearing not unlike a huge bee-hive. The pile is ignited at several points about the base, and as soon as the fuel is consumed the ashes are quickly scraped away, when powdered manure is thrown upon the vessel, causing a dense smoke. The vessel, in this stage of sudden cooling, absorbs sufficient carbon to become perfectly black and glossy upon such parts as have been previously polished. The accompanying figures refer to some of the forms recently received by the National Museum :

Pl. V, Fig. 39695, represents a small flat eating dish. Although not one of the older forms in shape, it illustrates a very simple one for manufacture. Pl. II, Fig. 39748, is a small water jar, and represents the most primitive form. In Pl. III, Fig. 39780, the neck appears, illustrating gradual improvement over the preceding. Pl. III, Fig. 39615, is a water jar with a handle, while in Pl. III, Fig. 39625, the handle is replaced by ears, admitting of suspension by cords. Pl. II, Fig. 39629, is grooved for the reception of a cord, to which others were attached either for carrying or suspension. Pl. III, Fig. 39650, presents both the groove and ears. Pl. II, Fig. 39832, is an odd form and represents a bird, while the grotesque object represented on Pl. II, Fig. 39824, is for no particular use, further than an exhibition of skill in the working of clay. Pl. III, Fig. 41053 is an unpolished black vessel used for cooking purposes.

The preceding are nearly all from the pueblo of Santa Clara, though they are typical of all those tribes already referred to. The contrast can be seen by comparing them with the following vessels from Zuñi:

Pl. V, Fig. 40317, and Pl. IV, Fig. 41609, are ordinary water jars, as is also Pl. II, Fig. 39510, though in this the constriction was made for attaching cords to aid either in carrying, or for suspension. Pl. IV, Fig. 40612, represents a condiment dish, the separate partitions being intended for salt, pep-

materials employed in the manufacture of pottery, besides toys, images, sacred objects, pipes, medicines, food, etc., etc.

I also embrace this opportunity of returning my sincere thanks to Major J. W. Powell, U. S. Geologist and Director of the Bureau of Ethnology, for granting me the use of illustrations intended for his forthcoming Annual Report. The numbers employed are those corresponding with the specimens as labeled in the National Museum.

per, etc. Pl. IV, Fig. 39962, is an ordinary eating dish, the spoon used in connection with it being shown on Pl. IV, Fig. 40417. Pl. IV, Fig. 40399, is a pottery basket, used in religious ceremonies to hold meal or flour, which is sprinkled on the heads of the sacred dancers and objects buried during the services. Pl. V, Fig. 40731, is a mortar and ball used for grinding the pigments used in decorating pottery. Although the present Zuñis utilize these, the articles were found by them in the ancient ruins, and were made by the pre-historic people. Most of the existing stone implements and weapons are found in the ancient ruins and utilized if practicable; the more common examples being hammers, as illustrated on Pl. V, Figs. 42208 and 42337, and axes, of which a fine specimen is represented on Pl. V, Fig. 40560.

Of the tribes who manufacture the black ware, the Cochiti Indians also ornament certain vessels with black lines, using a vegetable material called *wacca*.

Those tribes who manufacture the gray ware, with red, brown, or black ornamentation, have in several instances departed from the original forms of outlines, adopting characters and flowers found upon china imported by Mexicans or Americans. Zuñi pottery is generally known by the representation of animal forms, a typical example being given in Pl. V, Fig. 40317.

Prof. F. W. Putnam,* in speaking of the glazed surface of the gray pottery, says: "The gray clay seems to contain a large amount of silicious material, which, on being subjected to a great heat, becomes slightly vitrified. The vessels made of the gray-colored clay have apparently received a thin wash of the same, upon which the black ornamentation was put before baking, and the intense heat to which they are afterward subjected has vitrified this thin layer of clay, which now appears like a slight glaze. The polish is probably due to the smoothing of the surface with a stone before the thin wash was applied, as is now done by the present Pueblo Indians and by several tribes in the United States and Mexico."

According to the personal observations of Col. Stevenson, the glaze is produced, not by the heat, as the fire never reaches that intensity to fuse silica, but to the polishing stone which is used in rubbing the thin wash until dry previous to baking; the decorations being applied just before the vessels are ready for the fire. Prof. Putnam's remarks are not applicable to the Zuñi pottery, as before stated, that tribe does not use the polishing stone; the In-

* American Art Review for February, 1881, p. 153.

[Proc. D. A. N. S., Vol. III.]

dians of San Ildefonso using it, though in the manner just described.

CRANIA.

Examinations and comparisons of the crania obtained in the southwestern portion of the United States and northern Mexico, show that apparently characteristic peculiarities exist in all of those found in or about the ancient buildings and ruins, which are not present in crania of the adjacent regions nor in those of the present inhabitants. In the comparatively small number of crania thus far preserved in collections,* this peculiarity consists first, in the general absence of the superciliary ridges, and second, the existence of a remarkably prominent nasal eminence.

Another striking feature observed (as far as my examinations have extended) in the cranial remains from both north and south of that portion of the Mexican boundary is the constant occurrence of deformity, to a greater or less degree. In one instance of occipito-parietal flattening, the pressure upon the facial portion of the skull was so great, indirectly, no doubt, as to throw one orbit three-tenths of an inch above the normal position, while the other was correspondingly below it, the remaining facial bones being distorted in proportion. In nearly all the specimens, however, the flattening appears more strongly directed to either one side or the other, while in a few it is vertical occipital. In most instances this deformation might be attributed to the natural pressure of the cradle board, but the occurrence of such extraordinary asymmetry indicates that pressure was also, in certain cases, applied by bandaging, whether for the purpose as practiced in Central America or not, can only be surmised.

As is well known, cranial deformation† is attributed to pressure

* It is supposed that the Army Medical Museum at Washington, D. C., contains by far the largest collection of crania of the ancient Pueblos thus far collected by Government or private parties.

† The cradles, as constructed by the majority of our Indians of to-day, consist of a frame of wood, with a back, composed either of a piece of raw-hide or a network of thongs or cords of buckskin. As these substances are more or less yielding, the pressure is not so great as where a piece of board was used for the same purpose. "In Nicaragua," says Bancroft, "the heads of infants were flattened; the people believed that the custom had been originally introduced by the gods; that the compressed forehead was the sign of noble blood and the highest type of beauty; and, besides, that the head was thus better adapted to the carrying of burdens. In Yucatan, according to Landa, the same custom obtained. Four or five days after birth the child was laid with the face down on a bed and the head was compressed between two pieces of wood, one on the forehead and the other on the back of the head, the boards being kept in place for several days until the desired

produced by the cradle board ; by bandages across the forehead, or boards, to produce elongation as well as flattening ; posthumous distortion, in consequence of the combined influence of pressure and moisture ; and, as Dr. Humphrey Minchin states, naturally and congenitally deformed in consequence of obliteration by synostosis of some one of the sutures, the obliteration taking place during intra-uterine or early extra-uterine life and by presenting a point of resistance, causing the brain and with it the calvarial bones to be unduly developed in certain directions.

cranial conformation is effected. So great was the pressure that the child's skull was sometimes broken. * * Mr. Squier, following Fuentes' unpublished history, says that among the Quichés, Cakchiquels, and Zutugils, the back of the head was flattened by the practice of carrying infants tied closely to a straight board." Vol. ii, p. 731, 732.

The following references will be found of importance in further illustration of this subject, as well as noting the universality of the occurrence of asymmetrical crania:

J. Atkin Meigs. (M. D.) Observations upon the Form of the Occiput in the various races of Men. < Proc. Acad. Nat. Sci. (Phila. Pa.) 1860, p. 412 *et seq.*, and, by the same author, Description of a deformed fragmentary Human Skull found in an Ancient Quarry-Cave at Jerusalem. < Proc. Acad. Nat. Sci. 1859, p. 272.

On the Crania of the most Ancient Races of Man, Müller's Archiv. 1858, pp. 453. (By Prof. Schaaffhausen) is discussed and extended in the Nat. Hist. Review, 1861, pp. 155-176, pl. iv, v. [Compares cranial deformities between ancient Mexicans, Flatheads, and Europeans.]

Notes on the Distortions which present themselves in the Crania of the Ancient Britons. < Nat. Hist. Review, 1862, pp. 290-297, ill. 1-3.

Ueber asymmetrische Schädel. < Novara-Expedition. Anthropologischer theil, I abtheil., Wien, 1875, pp. 40-50, besides numerous notes throughout the work, giving measurements, etc.

Retzius: Present state of Ethnology in relation to the form of the human skull. < Ann. Rep. Smiths. Inst. for 1859. 1860, pp. 251-270.

Winslow: [Conformation particuliere du Crâne d'un Sauvage de l'Amérique septentrionale.] < Mém. de l'Acad. Roy. des Sci. pour l'année 1722. 1724, pp. 322-324, pl. 16.

[Isle aux Chiens, 78me degré de lat. et 310 on plus de long.]

Retzius: Cranier från Sandwichs-öarna och Oregon. < Öfvers. Kongl. Vetens.-Akad. Förhandl. för år 1847. 1848, pp. 31-36, 2 figures.

Retzius: Peruvianernas cranieform. < Öfvers. Kongl. Vetens.-Akad. Förhandl. för år 1848. 1849, pp. 140-147.

[Remarks upon the distinctive characteristics of the American races, etc.]

Crania Selecta ex Thesauris Anthropologicis Academiae Imperialis Petropolitanae. < Mém. de l'Acad. St. Pétersb. vi sér. Sci. Nat. viii. 1859, pp. 241-268, pl. 1-16.

[Important as relating to Aleutians: description, origin, measurements of crania; etc.]

Baer: Nachrichten über die ethnographisch-craniologische Sammlung der Kaiserlichen Akademie der Wissenschaften zu St. Petersburg. < Bull. Classe Phys.-Math. Acad. St. Pétersb. xvii. 1859, pp. 177-211. [Extended remarks on classification, measurements, etc., and on crania from graves from N. W. America. Voyez aussi Gosse's Essai sur les déformations artif. du crâne. Paris, 1855: Morton's Crania Americana: and Blumenbach's Decas Craniorum.]

Malformation of the skull appears occasionally dependent also, upon Cretinism, which is usually preceded by degeneration of the thyroid gland—goitre. This has been particularly noticed in the more elevated regions of Europe and Asia.* Hereditary syphilis is also claimed to have produced similar results, as M. Parrot found the remains of this disease upon crania of the ancient races of Peru and Bogota, which, he avers, caused the deformation.† Quatrefages cites Jourdanet's work as referring to the existence of syphilis in Mexico previous to the Conquest, and it is found by comparing the ancient Mexican sculptures, that cranial deformation existed, but this was produced artificially as a mark of distinction, as among the Central Americans. The Aztecs, however, are not known to have practiced this custom; though if they did, the practice had limited adoption.

A curious statement is made by Sir Robert Schomburgk, of Indians which he found on the Orinoco whose heads were flattened by nature. He saw a child one hour after its birth which showed all the characteristics of the tribe, “and the flatness of its head, as compared with the heads of the other tribes, was remarkable.”‡

The most prominent of our native tribes as having practiced head-flattening are the Flathead Indians of the northwest,|| though Dr. Suckley states that they do not practice this custom (1855). The Natchez, Choctaws, and in fact nearly all of the tribes within the borders of the United States, at one time practiced this custom to a limited extent, if all the literature is to be relied upon. It is more probable, however, that the frequent discovery of crania, deformed unintentionally by means of the primitive cradle board, has given rise to these statements regarding many of the Indian tribes.

In the following table, representing measurements of some of the crania from the region under consideration, metrical measurements are employed, as most convenient for the greater number of ethnol-

*See Ermines' Travels in Siberia, 1848, ii, p. 330; Saussure, Voyage dans les Alpes, 1786, iv; Ackermann, Ueber die Cretinen. Gotha, 1790; Foderé, Traité du Goitre et du crétinisme, a Paris, an vii.

† Les deformations craniennes causées par la Syphilis héréditaire. < Association Française pour l'avancement des Science. Compt. Rendus de la 6e Session. (Le Havre, 1877). 1878, pp. 665-674.

‡ Jour. Royal Geograph. Soc. xv, p. 53, 54.

|| Ueber Abplattung des Schadels bei Amerik. Indianern. < Forriep's Notiz. 1841, Bd. 19, p. 40. Ueber die Indianer aus Columbiaflusse. < *Ibid.* 1843, Bd. xxv, 2 ill.

ogists engaged in this study. The abbreviations are as follows : c. and c. c., for centimetres and cubic centimetres, respectively ; cap., internal capacity, measured by No. 8 shot ; L., the greatest longitudinal diameter, measured from the glabella to the most prominent part of the occiput ; B., breadth between the points of the parietal bones widest apart ; H., height, measured by calipers, from the middle of the anterior border of the foramen magnum to the most elevated point on the sagittal suture ; I. f. m., index of foramen magnum ; L. a., longitudinal arch ; C., circumference, by tape measure, on a plain including the glabella, occiput and prominent lateral elevations ; Z. d., zygomatic diameter ; and F. a., facial angle.

LOCALITY.		Cap.—c. c.	L.—mm.	B.—mm.	H.—mm.	I. f. m.	L. a.—mm.	C.—mm.	Z. d.—mm.	F. a.	Cephalic Index
1.	Pueblo Mounds, Utah	1145	160	138	122	39	324	476	126	79°	86.20
2.	" " " "		160	145	143	36.9	355	484			90.62
3.	" " " "		168	145		38.7	354	506		76°	86.30
4.	New Mexican Pueblos	1160	159	138	130	41	333	476		78°	86.79
5.	" " " "	1215	151	138			341	456	100	92°	91.39
6.	" " " "	1380	153	156	142	35	338	506	123	84°	101.96
7.	" " " "	1205	154	147	140	34	345	476	128		95.45
8.	Chaco Cañon, N. M.		155	142			323	460			91.61
9.	Mexican	1515	181	141	141	45	375	508	120	75°	77.90
10.	" " " "		170	138	130	41	346	486	122		81.17
11.	" " " "	1260	179	135	138	42	368	498		79°	75.41
12.	" " " "	1455	181	147	127	47	365	519	131	80°	81.21
13.	" " " "	1220	164	145	121	41	342	485	124	79°	89.02
14.	Arizona	1410	161	141	143	41.6		484	129	76°	87.57
15.	" " " "		155	138	145	35.5	340	460		72°	89.67

Nos. 1-3. From the southern portion of Utah. The mounds located in this region are supposed to have been built by the Pueblo Indians.

No. 4. Shows flattening over the left occipito-parietal region. From Laguna, N. M.

No. 5. Cranium of an "ancient" Pueblo from New Mexico, exhibiting marked flattening over the occipito-parietal region to the left of the median line, the deformation extending nearly as far as the temporal bone.

No. 6. Similar to preceding as to apparent age and locality. The occiput is nearly vertical in this specimen, the posterior portions of the parietal bones being included in the deformation, the

pressure having been directed more to the left of the median line.

No. 7. Presents flattening over the left occipital region, giving greater rotundity and prominence to the parietal bone of the same side.

No. 9. Cranium of a Mexican Indian taken from the church of San José, near San Antonio, Texas. Superciliary ridges pronounced; occipital bone remarkably prominent and projecting, with no presence of deformity by artificial means.

No. 10. Skull of a Mexican assassin, from the vicinity of Matamoros. Superciliary ridges less prominent than usually found in Mexican Indians. No deformation.

No. 11. Nasal eminence rather marked; no deformation beyond slight flattening over the superior portion of the occipital bone to the right of the median line.

No. 13. Cranium of adult Mexican, female, showing slight flattening over the anterior superior apex of the occipital bone and adjacent portions of both parietals.

Nos. 14, 15. Both specimens were obtained in a ruined cliff-dwelling several miles northeast of Camp Verdé, A. T. Several skeletons were lying side by side, buried under the fallen wall, as if death had occurred in defense of the place; the greater portions of the bodies were destroyed by fire as the surroundings plainly indicated, the crania and few of the adjacent portions only being preserved.

No. 8. This very deformed skull, already noticed, presents great occipito-parietal flattening, more to the left of the median line than upon the opposite side, producing remarkable prominence of the frontal bone. The measurements, as far as could be taken on account of partial fracture in transportation, are as follows:

Length, - - - -	155 mm.	Frontal arch, - - -	295 mm.
Breadth, - - - -	142 "	Parietal arch, - - -	?
Longitudinal arch, - - -	323 "	Occipital arch, - - -	223 "
Circumference, - - -	460 "	Length of Frontal, - - -	108 "
Index For. mag., - - -	?	Length of Parietal, - - -	124 "
Zygomatic diam., - - -	?	Length of Occipital, - - -	163 "
Facial angle, - - -	?	Cephalic index, - - -	96.61 "

The effect upon the cephalic index by distortion is strikingly illustrated in Nos. 6 and 7, respectively, viz. 101.96 and 95.45. To these may be added another, from a cliff-dwelling in Arizona, having an index of 101.96. The number of crania from these interesting regions are very limited, and until more material is ac-

cessible no results of a satisfactory nature can be arrived at, the average of measurements blending one known type with another, and it is impossible to state whether the peculiarities previously referred to will result as characteristics of the so-called ancient Pueblos, or not.

FEBRUARY 6TH, 1880.—GEOLOGICAL SECTION.

Prof. W. H. Barris in the chair. Five members present.

An amendment to the By-Laws was adopted changing the day of the regular meeting of the Section to the first, instead of the third, Friday in each month.

Prof. Barris read an interesting letter from Prof. Chas. Wachsmuth, of Burlington, Iowa, confirming Prof. Barris' views regarding the geology of this locality, and recognizing his genus of *Stereocrinus* as well established.

Prof. Barris presented several specimens of *Euomphalus de cœci* from Michigan, and from Cook's quarry at Davenport.

The following paper was presented :

Section of the Bluff at Sixth Street, Davenport.

BY W. H. PRATT.

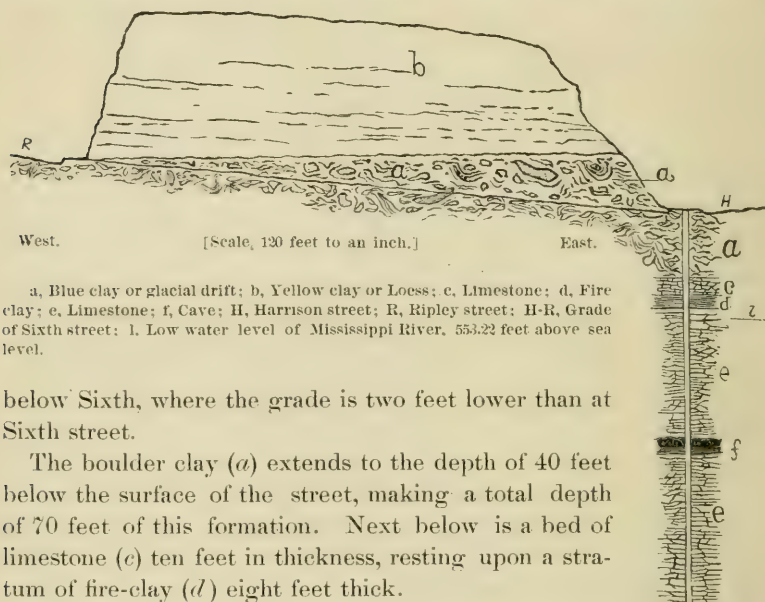
The bluff along Sixth street, between Ripley and Harrison streets, consists of a high narrow ridge between the Mississippi River bottom and a very broad ravine which extends back toward the west about half a mile, nearly parallel with the front slope, and terminates very abruptly at Harrison street. This ravine, like Duck Creek and other ravines and small streams on this side of the river, runs very nearly parallel with the Mississippi River, but descending in the opposite direction.

The lowest portion exposed to view is composed of the usual "blue clay" (*a*), or glacial drift, always containing more or less gravel irregularly distributed. In addition, it also contains numerous masses of sand in as irregular positions as possible, and looking as if they had been dropped in with the clay while in a frozen or otherwise solidified condition. Occasional exceedingly crooked and irregular lines of stratification are also observable. It appears evident that this whole formation must have been deposited in turbulent waters, before the cutting out of the ravine or the river valley. This deposit comes up to a level at about 90 feet above the low water level of the Mississippi

River and 25 or 30 feet above the present surface of the valley about this point. At the top of this formation is a quite regular horizontal and well defined line, showing the surface at the period immediately succeeding the time of the deposition of the drift.

Above this is the usual loess or "yellow clay" (*b*) to the depth of some 70 feet and reaching a level of about 160 feet above the datum line of low water mark.

A section of the underlying strata to the depth of 240 feet has been obtained by a boring for water by Mr. M. Frahm some years since. This boring was made at the side of Harrison street, a short distance



below Sixth, where the grade is two feet lower than at Sixth street.

The boulder clay (*a*) extends to the depth of 40 feet below the surface of the street, making a total depth of 70 feet of this formation. Next below is a bed of limestone (*c*) ten feet in thickness, resting upon a stratum of fire-clay (*d*) eight feet thick.

From this point downward the boring was continued 182 feet farther in a bed of solid limestone (*c*) excepting that at the depth of 142 feet from the surface the drill dropped eight feet in a small cave (*f*) in this rock. This cave contained water, and a pump was put in. After pumping nearly 1000 barrels of water, the cave was emptied and gradually refilled when the pumping was stopped, showing that the supply was only from the surrounding earth. The boring was then continued 90 feet farther, reaching the full depth of 240 feet from the street, 178 feet below low water mark of the Mississippi river, which is distant nearly half a mile, south.

As the results of some borings in other parts of the county rendered it probable that any water which might be obtained below this rock would be of a mineral character and unsuitable for brewery purposes, the work was discontinued at the above-named depth.

FEBRUARY 13TH, 1880. — HISTORICAL SECTION.

Mr. J. A. Crandall in the chair. Eight persons present.

Mr. P. V. Pope presented a stone pipe inlaid with lead, made long ago by the Indians and given to him by "Little Crow" (who told him he himself had cut it out) in 1838, about ten miles below Fort Snelling. "Little Crow" was afterward killed during the Sioux rebellion in 1862-1863, of which he was the leader. Mr. Pope read a very interesting account of this pipe and of Little Crow's connection with it.

Dr. Parry read a translation made by Dr. Fr. Brendel, of Peoria, of Volney's account of the early French settlers of Illinois, contained in his "Travels in America in 1792."

FEBRUARY 20TH, 1880. — ARCHÆOLOGICAL SECTION.

Mr. W. H. Pratt in the chair. Four members present.

The evening was spent in discussing the various published statements regarding the Tablets and Pipes in the collection of the Academy.

FEBRUARY 27TH, 1880. — REGULAR MEETING.

The President, Mr. W. H. Pratt, in the chair. Twelve persons present.

Miss Lizzie Myers and Messrs. C. J. Brown and Gilman Doe were elected regular members.

The following paper was read :

**Beds of Carboniferous Drift in the Bluffs
of East Davenport.**

BY TYLER Mc WHORTER.

The occurrence of a bed of carboniferous drift, at a high elevation, in East Davenport, is very interesting, though it is nothing more than we might expect.

The fact that we find no undisturbed beds of rocks of a more recent age than the Devonian, does not prove that the face of the country has been continuously above the water since that age. We have reason to believe that much of northern Illinois and of Iowa was beneath the ocean during much of the Carboniferous age ; and if exposed to surface degradation through the long duration of the Mesozoic ages, including the eroding forces of the Quaternary times, we may judge what an amount of the original surface rocks has been worn away !

Sufficient attention has not been directed to high beds of gravel that occur in many places. Such beds of gravel, if closely inspected, may, in many cases, reveal traces of what has been the character of the rocks that have been disintegrated from the surface of the country.

The upper Mississippi is one of the oldest rivers of the globe ; it once flowed at a much higher elevation than at present. The bed of the river has once had an elevation fully as high as the tops of the present bluffs ; for, while the river has for millions of years been wearing its channel continually deeper, the tops of the bluffs and the whole face of the country have also been wearing away by aqueous action. We should expect to find some traces of river gravel at high elevations.

When we consider the vast thickness of the Mesozoic formations that are revealed in the western mountain regions, and reflect on the duration of time required for the accumulation of this material in the bottoms of the oceans, we should also bear in mind that the material of which all these Mesozoic rocks were formed was mainly abraded from the face of the older continents, and was transported by rivers and spread over the floors of the oceans. From the thickness of the Mesozoic rocks, including the Permian, Triassic, Jurassic, Cretaceous, Eocene, Miocene and Pliocene, we may judge what a quantity of material has been thus removed.

MARCH 5TH, 1880. — GEOLOGICAL SECTION.

Mr. W. H. Pratt in the chair. Four members present.

Messrs. Gass and Blumer had just returned from a trip to Louisa county, and exhibited a second elephant pipe, a broken bird pipe, and a small copper axe, found in a mound on the farm of Mr. Haas.

Mr. Pratt presented some fossils collected at East Davenport.

MARCH 6TH, 1880.—BIOLOGICAL SECTION.

Mr. J. D. Putnam in the chair. Three members present.

Mr. Putnam exhibited a large collection of French Hymenoptera and Coleoptera recently received from Mr. L. Lethierry, of Lille, France.

MARCH 19TH, 1880.—ARCHÆOLOGICAL SECTION.

Mr. W. H. Pratt in the chair. Seven members present.

The evening was spent in work, mending and restoring broken pottery.

MARCH 26TH, 1880.—REGULAR MEETING.

The President, Mr. W. H. Pratt, in the chair. Nine persons present.

Messrs. E. Pester and E. H. Pierce were elected regular members. Prof. Chas. U. Shepard, Sr., Amherst, Mass.; Prof. Chas. U. Shepard, Jr., Charleston, South Carolina; Mr. Adolph Toellner, Milwaukee, Wis.; and Mr. S. S. Barr, of Walnut Grove, Iowa, were elected corresponding members.

Dr. C. C. Parry and Mr. J. D. Putnam were appointed delegates to represent the Academy at the 100th anniversary celebration of the American Academy of Arts and Sciences, at Boston, on May 26th, 1880.

APRIL 2D, 1880.—GEOLOGICAL SECTION.

Prof. W. H. Barris in the chair. Four members present.

APRIL 9TH, 1880.—HISTORICAL SECTION.

Mr. J. A. Crandall in the chair. Four persons present.

Communications were read from Judge Wm. L. Cook, of Davenport Township, and James E. Burnside, of Blue Grass, giving some interesting reminiscences of early times.

APRIL 23D, 1880.—SPECIAL MEETING.

The President, Mr. W. H. Pratt, in the chair. Five members present.

The following paper was read :

Exploration of Mounds in Louisa County, Iowa.

BY REV. A. BLUMER.

Having formerly resided in Louisa county, Iowa, and being well acquainted with the situation of the various groups of mounds in that region, and having become especially interested in the subject of Archæology on account of the discoveries recently made in various parts of the country, I visited that place during the first week of the present month in company with Rev. J. Gass, for the purpose of making some explorations among those mounds situated on the bluff on the west side of the Mississippi valley along the Muscatine slough, which latter has an extent of about thirty miles.

The country is here everywhere dotted thickly with ancient mounds. Many of them have already been explored by parties of the neighborhood and by strangers, but, as I learned, comparatively few relics have been discovered.

We visited several groups lying within the distance of a few miles, and finally determined to open those of a group situated two miles east of Grandview and three miles south of the boundary of Muscatine county. With the aid of Mr. Fr. Haas and a few men, residents of the vicinity, whom we engaged to assist in the labor, our work was begun on the farm of Mr. P. Haas, S. W. $\frac{1}{4}$ N. E. $\frac{1}{4}$ Sec. 25, Twp. 15 N, R. 3, where a considerable number of mounds had been examined some years ago by Mr. Lindley and others.

The first mound we opened, and the only one at the exploration of which I was present, proved to be a sacrificial or cremation mound. It is situated on the extreme edge of a prominent point of the bluff, having on both sides ravines extending down into the valley. Its form is that of a flat cone, of a diameter of about thirty feet and elevation of three feet.

Mr. F. Haas, who is the son of the owner of the land, has given, as he told me, considerable attention to the exploration of the mounds, and opened quite a number of them. Late last fall he made an attempt upon this one, but coming to a layer of very hard burned clay intermingled with coals, he found the work too difficult and abandoned it, and did not try digging here again until he joined in our work. These circumstances and the fact that in two neighboring mounds, one on each side of this, some relics were found by Mr. Lindley, attracted our particular attention, and we determined, with the assistance of Mr. Haas, to explore it thor-

oughly. An opening of five by ten feet was made. The surface was a layer of hard clay, about one and a half feet thick. Beneath this layer, which exhibited here and there the effects of fire, we found a layer of red burned clay, about as hard as a rather soft-burned brick. This layer was of an oval form, five feet in the shortest diameter, one foot thick in the center, and gradually diminishing to three inches at the circumference. Under this was a bed of ashes thirteen inches deep in the middle and also gradually diminishing to the edges, where it terminated, with the burned clay above. Not a single fragment of bone was discovered, but Mr. Haas found in his former examination of this mound a few fragments of human teeth. In the midst of this bed of ashes, a few inches above the bottom, were found a portion of a broken carved stone pipe, bird form, by Mr. F. Haas, and a very small copper axe by Mr. Gass, both of which articles are now in the Academy Museum; also a carved stone pipe, entire and representing an elephant, which was first discovered by myself, and which I hereby have the pleasure of presenting to the Archaeological department of the Academy Museum.

The work was continued by Mr. Gass.

Respectfully submitted,

REV. AD. BLUMER.

Geneseo, Ill., March 27th, 1880.

MAY 14TH, 1880. — HISTORICAL SECTION.

Five persons present.

Mr. Pratt reported that Mr. Howard Burtis had donated to the Academy the hotel registers of the Burtis House from 1872 to 1875.

MAY 28TH, 1880. — REGULAR MEETING.

The President, Mr. W. H. Pratt, in the chair. Eleven members present.

Miss Nellie W. Merriman, Jackson, Mich., and Mr. J. Q. Wing, Davenport, were elected regular members.

A letter was read from Mr. Robert Clarke, of Cincinnati, describing an inscribed stone recently found in Ohio, and sending a photograph of the same.

Prof. Josua Lindahl exhibited some dissections of *Helix pomatia*, in water and under the microscope, and gave an interesting explanation of the internal anatomy of the species.

JUNE 25TH, 1880. — REGULAR MEETING.

The President, Mr. W. H. Pratt, in the chair. Six members present.

Mr. C. T. Dahm, Rev. A. Blumer, Mrs. W. A. Nourse, Mrs. W. P. Hall, Miss Grace R. Hall and Mrs. G. W. Jenkins were elected regular members, and Mr. James Shaw and Dr. Henry Shimer, of Mount Carroll, Ills., as corresponding members.

SEPTEMBER 24TH, 1880. — REGULAR MEETING.

The President, Mr. W. H. Pratt, in the chair. Thirty persons present.

Mr. W. C. Egan, Chicago, Ill.; Prof. H. H. Babcock, Chicago, Ill.; Mrs. R. E. Latham, Lincoln, Ill.; and Mrs. C. H. Perry, Keokuk, Iowa, were elected corresponding members.

Dr. Farquharson gave a very complete and interesting report of his recent visit to Boston and the meeting of the American Association for the Advancement of Science; and of the exhibition there of the Academy's collection of prehistoric relics and the great interest manifested in them by the scientific people collected there.

OCTOBER 22D, 1880. — ARCHEOLOGICAL SECTION.

Mr. W. H. Pratt in the chair. Three members present.

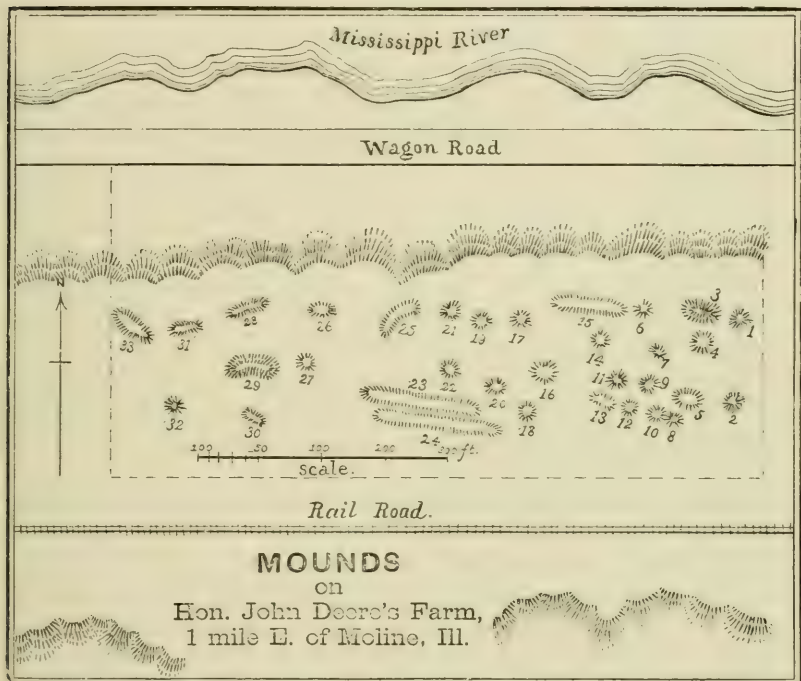
Mr. Gass gave a verbal account of several explorations which had not been previously reported, on account of the expectation of continuing the investigations at some other time, for which, however, no opportunity had occurred.

He gave a special description of a group of nine low conical mounds on the bluffs of the Wapsipinicon river, about three miles east of Wheatland, Clinton county, Iowa, which he visited in August, 1879. He opened four of these mounds, which were each about two feet in height and fifteen feet in diameter. They were composed of a mixture of black soil and clay, but exhibited no evidences of fire, and contained no bones or other relics.

Report of Exploration of Mounds in Rock Island County, Ill., in 1879 and 1880.*

BY REV. J. GASS.

In August, 1879, I spent a day, assisted by Mr. Toellner and Mr. Graham, in opening some mounds in Mr. Deere's pasture, one mile above Moline. The following is a plan of this group:



[For the use of this cut the Academy is indebted to the courtesy of Prof. Baird, Secretary of the Smithsonian Institution.]

The first mound we explored is situated in the first of the four rows of this group nearest to the Mississippi, and was of a conical form, one foot high and fifteen feet in diameter. Two and a half feet below the surface we found an irregular bed of limestone about three feet square, and below this layer of stones the decomposed remains of a human skeleton. No relics were discovered.

* See Proc. D. A. N. S., Vol. II., p. 291.

Also, Smithsonian Annual Report, 1879, p. 364.

On the same day we opened another mound west of No. 1. This mound was of oval form, fifteen by twenty-five feet and two and a half feet in height. Two and a half feet below the surface we found a layer of limestone rock, accurately fitted together, and forming a rather smooth surface, in the shape of a half circle. Below this pavement was resting a skeleton in a sitting position. The bones were entirely decayed except the cranium, which was better preserved, and is presented to the Museum. No relics were found.

[This mound is marked 3 on the plan].

The mound marked 5, in the same row, west of the above, is forty-six feet long and six feet broad, and but a few inches above the surrounding earth. On this mound, immediately below the green sod is, extending through the whole length, a layer of limestone, which here and there is not quite covered by the sod. On the same day, we made an opening in the west side of this mound, five feet long and four feet wide. Under this stone bed we met with a second one, and below this second layer of stones appeared a mixed soil, intermingled with little stones up to the size of a child's head, but not the least sign of human bones or relics. Two weeks later, we (Mr. Toellner and myself) made some further explorations in the same mound, extending the first opening twelve feet farther, but found everything in the same condition as above described. Neither bones nor other relics were to be found in this mound.

September 3d, 1879, I examined some mounds on Copper creek, in Section 23, Township 16, Range 4 west. The first one is of conical form, one and a half feet high and twenty-five feet in diameter. This mound has been formerly much higher, but has been reduced by tilling the ground for fifteen years. I made an excavation a few feet square and found near the surface a layer of mixed soil, three feet thick, below this layer a bed of sand of four inches, and under this a human skeleton very much decayed. On the right hand side of this skeleton a few fragments of pottery were found, and a piece of copper having the appearance of an unfinished mound builder's axe.

The second mound opened on the above date is nine feet high and oval, sixty by ninety feet, and was formerly much higher, having been scraped down a good deal by the owner several years ago. It is situated in a very low portion of the valley, near the junction of the two creeks. We made an opening about six feet square at the most elevated point of the surface and down to the natural soil, penetrating various layers of sand and clay. This material must

have been taken from the neighboring hills, as the bottom of the valley along the creeks is only a black alluvial soil. Charcoal, ashes and burned stones, and also chips of flint and fragments of pottery were found here, but no indications of human remains. This was, perhaps, not a burial mound.

The third mound—west of the second—on the right hand side and near Big Copper creek, is of conical form, four feet high; diameter thirty feet. We made an opening six feet square and went four feet down through a mixed earth, then one foot through a black soil. Beneath this we discovered two skeletons, in a horizontal position, extending east and west. Under the skull of one of these we found a carved stone pipe, of the usual type of this region—curved base, perforated to serve as stem—and representing some animal, perhaps a seal, perhaps a porcupine, and also a flint implement. The bones were too much decayed to bear removal.

April 15th, 1880, I explored some mounds on the Mississippi bluffs, near Brownsville, in Sec. 27, Twp. 17, R. 9. There are five mounds in a single row, at distances of fifty to one hundred feet apart, having an average height of one to one and a half feet and a diameter of about fifteen feet. In the first one, nearly two and a half feet below the surface, I found, by the side of a few human bones, a stone chisel. In the next, at a depth of two and a half feet, I found human leg bones. In the third, two feet below the surface, were a few pieces of charcoal, four leg bones, and a stone knife. In the fourth and fifth I found, besides some human bones, a few pieces of elk horns, some of which were fashioned into awls or very narrow chisels. These five mounds seem to be of more modern character—perhaps Indian graves.

In the neighborhood of Illinois City there are a great many mounds. The most of these have been partly dug up many times, but, so far as I could learn, no relics have been found. On May 12th, 1880, I tried three of those which had not been disturbed, situated in Sec. 12, Twp. 16, R. 5, but found nothing but a few bones at a depth of about three feet. These mounds were about two and a half feet high and thirty feet in diameter.

June 22d I investigated five mounds in Rock Island county, opposite Fairport, in Sec. 6, Twp. 16, R. 4 w, on a high bluff, commanding a grand view. Two of this group had been opened by parties before we went there. The first mound we opened was three feet high and fifteen feet across—conical. A layer of mixed

earth three feet thick covered here a human skeleton, which was lying in an east and west direction, and near this skeleton were a number of arm and leg bones. The next mound was one of those already explored.

The third mound in order eastward was four feet high and thirty feet in diameter. Five feet below the surface we found, in a small ditch two feet across, a great number of human bones—of arms, legs, skulls, shoulders, etc.—all mingled together. In one of the best preserved skulls, in the back part, we found the bone of a finger in a quantity of earth. This clearly proves that the whole corpse was not buried here, but only the bony remains of human beings.

The fourth mound is two feet high and fifteen feet in diameter. Nothing was found, except a few bones, about two feet below the surface.

The fifth mound was three feet high and fifteen in diameter. Here we found a skeleton at the depth of three feet, lying horizontally, east and west.

The next mound—the sixth—had already been opened.

The seventh was four feet high and thirty feet across. At four feet from the surface were found two skeletons, one lying east and west, the other north and south. The bodies must have been here disposed on the natural ground, and the earth afterward piled over them. The bones were much decayed, and were accompanied by no relics.

September 14th I opened a mound on Copper Creek, Sec. 24, Twp. 16, R. 4, which belonged to a group which have been so reduced by long tillage of the soil, that they have disappeared entirely, except two which were situated in woodland. These two were about two feet high and fifteen feet wide, conical in form. We made in the first one an opening a few feet square, and at a depth of two and one-half feet we discovered pieces of rotten black walnut wood, four feet long, lying crosswise over the grave. In this grave, or excavation, and beneath the wood, was a light black earth composed of rotten grass or foliage, and beneath this layer a few human bones, and close beside them, a plain mound-builder's pipe and one arrow-head.

The other mound was constructed like the one just described, and we found, with a few decayed bones, two flint implements. At the base of the two mounds were graves three feet deep, extending east and west. The earth which was over these graves, and forming the whole mound, was a black soil from the surrounding surface, and we

could trace how far from the mound the soil had been stripped off for the creation of the mounds, as it is in that locality scarcely more than two inches in thickness when undisturbed.

In Buffalo Prairie township, Rock Island county, on the eastern bluff of the Mississippi, opposite Pine Creek, Mr. M. Kurt, while engaged in digging and hauling sand, found two carved stone pipes, which I obtained, and they are herewith submitted. They are composed of a soft, dark-colored stone; possibly a variety of talc, of the usual mound-builders' type, one representing probably a howling wolf—the other, plain.

Human bones are found in the same locality, which, by the people there, is commonly called "the Indian burying-ground."

In another report I will give the particulars of the different explorations in Louisa county during the present year.

Respectfully submitted,

J. GASS.

NOVEMBER 5TH, 1880. — ADJOURNED REGULAR MEETING.

The President, Mr. W. H. Pratt, in the chair. Six members present.

Messrs. N. Kuhnen, H. Kurmeier, H. W. Lewis, and Miss Julia Sanders, Mrs. H. M. Conner, and Mrs. Sophie C. Gronen, were elected regular members; and the following persons were elected corresponding members, viz: Mr. H. F. Suksdorf; Dr. J. R. Cardwell; Mr. L. F. Henderson; Rev. T. L. Eliot; Dr. H. Carpenter and Prof. Thomas, of Portland, Oregon; Wm. Suksdorf, of White Salmon, Washington Ter.; Dr. W. F. Tolmie, of Victoria, Br. Columbia; O. B. Johnson, Salem, Oregon; L. M. Culver, Waukegan, Wis.; Prof. E. W. Claypole, Antioch College, Yellow Springs, Ohio; and Miss Mary Porter, residing at Peking, China.

The President read the following letter from Rev. S. S. Hunting:

DES MOINES, OCT. 6TH, 1880.

W. H. Pratt, President of the Davenport Academy of Natural Sciences:

DEAR SIR:—As I have removed from Davenport, I now tender my resignation as one of the trustees of your Academy. In doing so I am reminded of the honor which the Academy has conferred upon me since I have been one of its members. As I *have been* interested, so I *shall* continue my interest as a life member of the Academy. I trust that you will be prospered in the future, and be able to bless yourselves and many others in true Science, which is real knowledge.

Most respectfully, yours,
S. S. HUNTING.

On motion, the resignation of Mr. Hunting was accepted.

Some discussion was had regarding the practicability of instituting a course of instructive lectures, but no definite plan was developed.

NOVEMBER 19TH, 1880. — ARCHÆOLOGICAL SECTION.

W. H. Pratt in the chair. Three members present.

NOVEMBER 26TH. — REGULAR MEETING.

The President, Mr. W. H. Pratt, in the chair. Nine members and two visitors present.

Mrs. W. G. Shand was elected a regular member, and Mr. J. B. Kiel, of Montrose, Iowa, a corresponding member.

Mr. J. D. Putnam made some interesting remarks upon several scientific societies and libraries at the East, which he had recently visited, giving a brief description of some of the collections and of the arrangement of cases. He spoke of the uniform courtesy with which he was received, both personally and as representing the Davenport Academy, and the favors extended to him in the use of rare and valuable books, in his researches in the literature relating to the Solpugidæ.

The following paper was read:

Exploration of Mounds in Louisa County, Iowa.

BY REV. J. GASS.

In the early part of March last, accompanied by Rev. A. Blumer, of Geneseo, I visited Grand View township, in the county above mentioned, and examined the different groups of mounds which are thickly scattered along the bluffs overlooking the Mississippi bottom for many miles, only here and there interrupted by deep ravines, and which in many places extend back to a considerable distance from the edge of the bluffs. We explored at that time ten mounds, a full report of the first of which, dated March 27th, has been presented by Mr. Blumer, and I will describe the others in the order of the work.

As the land on which some of them are situated has been cultivated for a long time, it is now impossible to determine the original elevation of such mounds.

The next mound we opened—which I will call No. 2—is situated

on Mr. P. Haas' farm, S. W. $\frac{1}{4}$ of N. E. $\frac{1}{4}$ of Section 25, about fifty yards west of the first (reported by Mr. Blumer), and in the second row of this group, extending north and south, approximately parallel with the edge of the bluff, the mounds being arranged in several somewhat irregular rows, all running in the same direction. This mound was about fifteen feet in diameter and one and a half in height, and composed of a mixture of the adjacent common soils to the depth of three feet, where the natural undisturbed yellow clay was reached. On the bottom were some remains of a human skeleton, all much decayed. A few splinters of flint were also found.

Mound No. 3 is situated close to the edge of the bluff, in the first row, about fifty yards southward from the first one. Its diameter was about twenty feet, height two feet. At two feet from the surface we discovered an excavation into the natural soil, extending downward two feet farther, and one and a half in diameter, entirely filled with ashes and coals. No relics nor bones were found.

Mound No. 4 is fifty yards south of the third one, twenty-five feet in diameter and three in height. Here, as in No. 2, we met with the same kind of soil, three feet in depth, but this stratum was resting upon a layer of white clay, as hard as cement, eight inches thick down to the natural undisturbed yellow clay. On the south side this layer sloped a little and grew thicker in that direction, and here were the remains of two skeletons, lying in a horizontal position and extended northwest and southeast, imbedded in this clay. Only portions of the larger bones were preserved. The skulls rested on a large stone. Some fragments of arrow heads were the only relics found.

Mound No. 5—about ten yards west of No. 4, and in the second row—is twenty-five feet in diameter, and three and a half in height. From the surface two and a half feet down, it is composed of a mixed soil like Nos. 2 and 4, resting, as in the latter, on a layer of white clay, from eleven to fifteen inches thick. Under this layer, but rather at one side, we found a small quantity of ashes and coals, and in the center, in an excavation two feet across and two and a half deep, were the remains of a skeleton, in a sitting position. No relics here.

Mound No. 6, nine yards northward from No. 5, and also in the second row, is twenty feet in diameter and two and a half in height. It consists of a mixture of the common soil resting on the natural hard clay. No relics were to be found, and only a few fragments of decayed bones.

The three mounds last mentioned belong to the same group with the other three, but are situated on Mr. Stoddard's farm, N. W. $\frac{1}{4}$ of S. E. $\frac{1}{4}$ of Sec. 25, and are covered with young trees.

Mound No. 7 is sixty yards north of No. 6, in the same row, and is on Mr. Haas' land; diameter fifteen feet, height one and one half—composed of soil like No. 6. No relics and not a single fragment of bone.

Mound No. 8 is one mile and a half north of those last described, on the farm of Mr. Dickenson, S. W. $\frac{1}{4}$ of Sec. 13. It is located on the most elevated point in the vicinity, and the observer has here a grand, far extended view over the surrounding country. This mound is about three hundred yards from the edge of the bluff and in the center of a numerous group of small ones. It is eighty feet in diameter and six feet high. The earth covering this mound was also a mixture of common soil, but much softer than in all the rest. At a depth of six feet we discovered three skeletons in a horizontal position, one having the head toward the east, and the other two with the heads toward the west. Some of the arm and leg bones were very well preserved and remarkably strong, but the skulls were entirely decayed. South of these skeletons we found a quantity of ashes and coals, intermingled with burnt clay and flint fragments. No relics.

Mound No. 9 is one-eighth of a mile south of No. 8, on Mr. Gast's farm, N. W. $\frac{1}{4}$ of N. W. $\frac{1}{4}$ of Sec. 24. This is also a large mound—dimensions same as the last mentioned—and is nearly two hundred yards from the edge of the bluff, but not surrounded by smaller mounds. At the depth of six feet we found only a small quantity of ashes and coals.

Mound No. 10, the last one we opened, stands on Mr. Godfrey's farm, N. E. $\frac{1}{4}$ of N. W. $\frac{1}{4}$ of Section 24, about two hundred yards from No. 9, close at the edge of the bluff overlooking the valley of the Mississippi. Its diameter is twenty-five feet, elevation four feet. One foot below the surface was reached a mass of decayed human bones, which proved to be a bed of them, five or six feet across and three and a half feet in thickness. They were lying in various directions without order or arrangement. No relics were discovered.

In August I again visited the same neighborhood for the purpose of making further investigations.

In Section 24, on a prominent point of the bluff commanding a splendid view, I found a group of six mounds disposed in the form

of a crescent, and west of this group the whole field of many acres is covered with hundreds of mounds.

The first of the above mentioned group, opened by Mr. Kallenberger, is situated at the southern end of the semi-circle, on Mr. K's land, at the extreme northwest corner of the S. E. $\frac{1}{4}$ of Sec. 24, and is the largest, viz: eight feet high and about a hundred feet in diameter.

An excavation from the center of the surface down to the natural soil at the depth of six feet, showed a mixed earth, with only fragments of flint implements. The next layer of earth, one and a half feet thick, was a mixture of sand and clay, and in this he found a flint knife and a perforator. Beneath this layer of sand and clay he discovered four skeletons, lying with the heads toward the west, with a number of other human bones and pieces of skulls. Near the second skeleton he found a pipe of dark red pipe stone, plain, (No. 7060,) and a very small copper axe, (No. 7063.) Another excavation was made in the same mound, in the eastern side, where he found two other skeletons and, near the skulls, two pipes (Nos. 7390 and 7391) and a portion of the bones of a child, and near them a few copper beads.

The second mound of this crescent group is situated forty-five feet northeast of No. 1 and is three and one-half feet high and forty-five feet in diameter. Four feet deep we found three skeletons, with the heads westward, and a few fragments of flint and pottery. The bones in both of these mounds were very much decayed.

The third mound, thirty-five feet north of No. 2, is three and a half feet in height and thirty feet in diameter. One and a half feet from the surface, the earth appeared to be a burnt clay, and one and a half feet further down, this clay was as hard as a soft-burned brick. Below this layer of burnt clay, he met with an ash-bed of eleven inches thickness, of oval form, four by five and a half feet. Near the center of this bed of ashes was a small copper axe, (No. 7062,) which showed indications of the action of fire. No. bones were found here. This was, perhaps, a cremation and not a sepulchral mound.

The last two were also explored by Mr. Kallenberger.

The fourth mound, explored by myself, thirty-six feet northward from the last described, was about three feet high and thirty feet in diameter. Four feet down were a few human bones, some broken pottery and flint implements, and nothing more was found.

The fifth mound was forty-six feet from the fourth ; was three feet high and thirty feet across. Three feet from the surface I found a few bones, but nothing more.

The sixth mound, forty-five feet northwest from the fifth and on Mr. Rockroth's land, is six feet high and one hundred feet in diameter. On the surface of this one the rotten stump of an oak tree, two and a half feet in diameter, is standing. We made an excavation eight by thirteen feet. About two feet down we found the skeletons of three Indians, which were very much decayed. All the earth six feet down to the natural soil, was a mixed clay and black soil, containing no bones. A farther excavation in a north and south direction revealed two skeletons on the south side, one a male and the other a female, the former having the head westward, and the latter eastward, the feet meeting at the center. No other relics were found here.

We next explored two other mounds, standing rather apart from the rest, on land belonging to Mr. Schleicher, S. E. $\frac{1}{4}$ N. W. $\frac{1}{4}$ Sec. 24. One of these was four feet high and about seventy-five feet in diameter, and at the depth of four feet were found two human leg bones and some fragments of pottery and flints. The other, about thirty-five feet south, three and a half by fifty feet, contained only a few bones.

At the same time we explored three other mounds a short distance from those above described. The first of these, on Mr. Gast's farm, N. W. $\frac{1}{4}$ N. W. $\frac{1}{4}$ Sec. 24, is a single mound, six feet in height and 100 feet in diameter. An excavation was made, ten feet in diameter and six feet deep, but nothing was found except two arrow-heads. The excavation was then extended in different directions with the same result.

The next mound, on Mr. Godfrey's land, N. E. $\frac{1}{4}$ N. W. $\frac{1}{4}$ Sec. 24, is four and a half feet high and forty-five feet across. Three and a half feet below the surface we discovered a whole layer of human bones, but in such confusion that the positions of the several skeletons could not be ascertained. A singular circumstance in connection with this, and the only such instance I have ever known, was a smell of decay, which was almost unendurable. No relics were found.

The third mound is thirty feet south of the last described, and is three feet high and thirty feet in diameter. At the depth of three feet we found the remains of two skeletons and nothing more.

Next, on Mr. Vibber's farm, at the N. E. corner of the N. W. $\frac{1}{4}$ of Sec. 13, we opened four other mounds.

The first was three feet high and thirty feet in diameter. Here we found nothing but a few human bones at the depth of three feet.

The second, fifteen feet from the former, was two and a half feet high and thirty feet across. Two and a half feet down we discovered one human arm bone and one leg bone.

The third mound was three feet high and of oval form, fifteen by thirty feet. At the depth of three feet were two skeletons, imbedded in the clay; no relics.

The fourth was two feet and a half high and twenty-five feet in diameter. Nothing was found here except a few decayed bones.

In addition to the above explorations, Mr. Kallenberger has opened in the same group, at my request, six other mounds, but without any valuable results.

Other people, from Muscatine and elsewhere, have opened a great many mounds in the same vicinity but, as far as I could learn, with no better success.

Not long previous to the investigations above referred to, Mr. David Young and others opened two mounds on a projecting point of the bluffs on Mr. Godfrey's land, N. E. $\frac{1}{4}$ N. W. $\frac{1}{4}$ Sec. 24. In these they found a finely-carved sandstone pipe, (No. 7061.) representing a bird, also a copper axe and a very large copper bead. The pipe and bead are already in our museum, and the axe is promised but not yet received.

In November we made the third exploration of mounds in Grandview township, but on account of stormy weather only two mounds could be opened, and nothing was obtained from them. These were on Mr. Kallenberger's land, S. W. $\frac{1}{4}$ Sec. 24.

At my request and under my direction, Mr. F. Haas has explored eight mounds on his father's farm, N. E. $\frac{1}{4}$ Sec. 25, and obtained for our museum one plain pipe of red pipestone, a few shell beads, an obsidian arrow head and a number of flint implements.

I have thus briefly described the exploration of seventy-five mounds during a period of a little over one year, and as the result of the whole work we have secured four skulls, twelve pipes, four copper axes, a number of copper and shell beads, and a considerable number of flint, stone and horn implements. This may seem a small result in comparison with the amount of labor required, but as the value of mound-builders' relics is increasing every year, it seems

quite desirable to secure all we can before the opportunity is gone.

Respectfully submitting the above report, I wish to express my most sincere thanks to the Academy for the kind assistance they have always given me, and especially during the past year.

J. GASS.

DECEMBER 3D, 1880. — GEOLOGICAL SECTION.

Prof. W. H. Barris in the chair. Three members present.

Prof. Barris gave an interesting account of his explorations during the past summer in the vicinity of Alpena, Mich., and presented about thirty species of Devonian fossils gathered there. He also spoke of several new species of fossils recently discovered in this vicinity.

DECEMBER 17TH, 1880. — ARCHÆOLOGICAL SECTION.

W. H. Pratt in the chair. Four members present.

Plans were discussed for obtaining data for maps and charts of the mounds of Iowa and Illinois.

DECEMBER 31ST, 1880. — REGULAR MEETING.

The President, Mr. W. H. Pratt, in the chair. Seven members present.

Article III, Sections 1 and 2, of the By-Laws of the Academy, were amended, so as to read as follows :

Section I. Every regular member-elect shall pay to the Treasurer an initiation fee of five dollars (\$5.00), and the assessment for the remaining portion of the current year.

Section II. Every regular member shall be subject to an annual assessment of two dollars (\$2.00), payable to the Treasurer on the first day of January of each year.

Dr. E. Schlegel, Mr. N. V. Kuhnen, Mr. Louis Hanssen, and Mr. Herman Lerchen were elected regular members. Mr. James W. Christopher, New York ; Mr. James Bannister, New York ; Prof. A. J. Cook, Lansing, Mich. ; Prof. A. R. Grote, New Brighton, N. Y. ; and Mr. Daniel Swiney, Ramelton, Ireland, were elected corresponding members.

The following papers were read :

“Ancient Fortification in Louisa County, Iowa,” by Rev. J. Gass.*

Exploration of Mounds in Mercer County, Ills.

BY REV. J. GASS.

On the bluffs in Mercer county, Ills., are found, as on the Iowa side, great numbers of ancient mounds. Hundreds of them are scattered in groups through an extent of many miles along those bluffs. A considerable number of those mounds have been explored by various parties during several years, but usually with very little success in obtaining relics.

Late last fall several young men—Messrs. Herig, Weiss, Hitt and others—opened some twelve or fifteen mounds on the Mississippi bluffs. In the first four—each about three feet in height and thirty feet in diameter—they found, three feet below the top, a quantity of human bones resting upon the natural surface, over which the mound had been built. No other relics were found.

In the fifth—four and a half feet high and sixty feet in diameter—were found, from four to five feet down, the remains of human bodies, lying in an east and west direction. Above the skull of the skeleton at the right, was found a pipe of soft, dark-colored stone—probably a variety of talc—representing a lizard, and one flint implement.

The sixth, seventh and eighth were about three feet in height and thirty feet in diameter, and in these were found only human remains, at a depth of three feet. No other relics.

The ninth was four feet high and forty-five in diameter. About four feet below the top were found the remains of three skeletons, lying with heads toward the west. Three inches from the skull of the middle one was another pipe of the kind of stone above-mentioned, representing a turtle, and one flint implement. Both these pipes were of the usual type, having the curved and perforated base.

The tenth mound was a quite small one—three feet high and fifteen feet across. Nothing was found here, except a few human bones, about three feet below the surface.

The eleventh was the largest mound of all, being about five or six feet high, and sixty feet across. About one foot down were the remains of an Indian skeleton, and at five feet were skeletons lying horizontally upon the original surface of the ground, with the head toward

*The illustration not being ready at the time of printing these sheets, this paper will be found farther on.

the west. These skeletons were covered over with a layer of split oak wood, very much decayed, lying crosswise, or north and south.

Between the skulls was found a piece of galena, much coated with carbonate, one flint arrow-head, a small piece of obsidian, and a very remarkable stone pipe, representing a snake coiled around an upright cylinder (or stump?) and covered with some very thin metallic coating—probably galena.

Near the right hand of the left skeleton were found some fragments of a much decayed sea-shell. In the other mounds explored nothing was found except a few bones.

The three mounds containing the relics above mentioned were all situated in the front row, near the edge of the bluff. The bones were all much decayed, and no skulls were obtained which could be preserved. The bodies, when buried, had been placed upon the natural surface of the earth and the mounds built up over them, composed of earth taken from the surface in the immediate vicinity. The turtle and lizard pipes were obtained for the Academy, and are now in the Museum, contributed by Mr. Pratt.

The most important pipe, representing the serpent, and with metallic coating, I have as yet been unable to obtain for the Academy, except as a loan for examination and exhibition.

These three pipes are, like all those found in the mounds of Iowa and adjacent portions of Illinois, of the usual *curved base* type, which form, so far as I can learn, has never been found associated with copper arrow and spear heads, and knives like those in the Wisconsin Historical Society collection. Nor has any other form of pipe ever been found in connection with such copper implements (axes, celts, &c.) as those in the Davenport collection.

JANUARY 5TH, 1881. — ANNUAL MEETING.

The President, Mr. W. H. Pratt, in the chair. Twenty-seven members and four visitors present.

The several officers presented their reports as follows :

The CORRESPONDING SECRETARY, Mr. J. D. Putnam, reported 434 letters written and 537 letters received, an increase over any previous year, notwithstanding that other duties had forced him to neglect the correspondence to a considerable extent. The exchange of printed publications has also been very considerable ; though not so great as it might have been if the proceedings could have been distributed more promptly.

The RECORDING SECRETARY, Miss Lucy M. Pratt, reported that there have been held during the year one annual, nine regular and one special meeting of the Academy, with an average attendance of twelve persons. The Geological section held five, the Historical section four, and the Archaeological section six meetings, with an average attendance of four. Two entertainments of a popular nature were given—a children's entertainment on Washington's birthday, and a May-day festival. Three lectures were given—two by Mr. J. Q. Wing, on the "Pre-Historic Age," and one by Mr. Daniel Swiney, on "Ireland." Six Saturday afternoon "talks" were given by Messrs. Lindley, DeArmond, Pratt, Preston, Hazen and Bowman. Five original papers were read at the meetings by Messrs. Hoffman, McWhorter and Gass. Twenty-five regular members and twenty-nine corresponding members were elected, and five regular members transferred to the roll of life members.

The Treasurer, Mr. Charles E. Putnam, made a very full detailed report, of which the following is a condensed summary:

RECEIPTS.	EXPENDITURES.
Cash on General Fund....\$ 797.27	Paid on General Fund.... \$ 781.92
" Endowment Fund. 511.82	" Endowment Fund. 508.82
" Ladies' Special " 442.77	" Ladies' Special " 442.73
" Publication Fund. 595.06	" Publication Fund.. 554.15
" Mound Fund..... 83.10	" Mound Fund..... 83.10
Total..... \$2,430.02	Cash on hand (all funds).... 59.30
	Total..... \$2,430.02

The total cost of the publications of the Academy from January 1st, 1877, to January 1st, 1881, has been \$1,807.36. Of this sum \$1,051.00 has been raised from subscriptions and sales of publications, \$239.90 was borrowed for printing the reports of 1878, and assumed by the Trustees of the Academy, and the remaining \$516.46 was advanced by the chairman of the publication committee, who has personally assumed all the liabilities from the publication of Volume II of the Proceedings of the Academy.

An estimate of the probable receipts of the year 1881 amounts to \$693.39 and of necessary running expenses to \$618.20. These estimates are, of course, approximate only. Probably the general receipts and expenditures will not greatly differ from those of 1880. No estimate is made for scientific investigations, nor for publication,

which, however, should not be overlooked. From \$500 to \$1000 could be profitably expended in these directions.

The indebtedness during the year has been as follows :

	Jan. 1880.	Jan. 1881.	Net Decrease.
Outstanding notes	\$1,739.90	\$1,389.90	\$350.00
Unpaid interest	59.60	19.20	40.40
Unpaid orders	153.50	50.56	102.94
Open accounts	20.25	7.83	12.42
Totals	\$1,973.25	\$1,467.49	\$505.76

A note of \$500 on account of building has been paid, and a note of \$150 made for a temporary loan, on account of the general fund, to replace money borrowed from the endowment or building fund. The hope is entertained that during the coming year the \$1,000 encumbrance on the Academy property may be removed.

The number of life members on the books of the Treasurer is 63 ; the number of regular members is 161 ; making a total of 224. Of these, the number in good standing and qualified to vote at the present time is 162.

The LIBRARIAN, Mr. C. T. Lindley, reported the number of books now in the library, belonging to the Academy, to be 1,013 bound volumes, 1,596 unbound volumes and 525 pamphlets, 3,134 in all. There are also 888 volumes and pamphlets deposited by members, making a total of 4,922 volumes and pamphlets. More than 100 scientific periodicals are received regularly in exchange for the Proceedings.

The CURATOR, Mr. W. O. Gronen, reported as follows :

There is here to-night among us hardly one not familiar with the history of the explorations of Rev. Mr. Gass, Capt. Hall and Prof. Barris. You all know what rich treasures of archaeological and geological value and importance these indefatigable workers have wrought from mother earth, and a glance at our collection of mound-builder's pipes, copper axes and other implements of the same metal, ancient pottery, stone and flint implements, as well as at the valuable contributions of geological specimens, some of them entirely new species, many of them very unique and rare, all of which, with but a few exceptions, are the generous donations of these hero explorers, and the result of their own personal self-sacrificing work, will simply justify my assertion that not only this institution, nor

this community, but the whole scientific world owe a debt of gratitude to these missionaries in the field of science.

As for the work done, that was necessarily connected with the cleaning, assorting, arranging, labeling and distributing among the various departments represented in our museum, I can assure you, this work is of a frightening magnitude. For this the Academy is solely indebted to Mr. Pratt, and not to me, as he has, with faithfulness and energy not paralleled in the history of our institution, besides his duties as president, also taken this great amount of labor and responsibility practically upon his own shoulders.

Mr. J. D. Putnam, chairman of the PUBLICATION COMMITTEE reported that the printing of the letter press of Volume II of the Proceedings of the Academy was completed on February 2d, but a long and unexpected delay occurred in the printing of the steel plates, so that it was May 14th, when the first complete copies were received, and August 17th when the work was finally completed, and it has not yet been fully distributed. Four new photographic negatives were made during the year, making a total of eighty-three now on hand. A few prints of these and a few copies of Vol. I and Part 1 of Vol. III of the Academy's Proceedings have been sold or otherwise distributed. It was recommended that the publication of the Proceedings be resumed as speedily as possible, and it was suggested that the printing could be done in the building with considerable economy and convenience.

The President's Annual Address.

BY W. H. PRATT.

In presenting a report, as the outgoing President is required to do, of the condition and progress of the Academy in all its departments, it may be interesting to refer briefly to the history of the rise and growth of one now very interesting and important branch of the science of archaeology—itself a comparatively new one—and one in which the Academy has been especially engaged, viz: the history of the pre-historic people of the Mississippi Valley. At the period of the organization of our society probably few persons had ever heard of the term now in so common use, “the mound-builders.”

The tumuli scattered over all this region of country, and which had attracted little attention, had been considered “Indian graves,” and few, or perhaps none, had been explored further than to unearth some of what are now known as “intrusive burials,” made by a

more modern people than those who built the mounds, and occupying them merely because they afforded a position higher and drier than the surrounding surface. These burials were at a depth of but two or three feet, and after exploring so far from mere curiosity, the search was carried no deeper, and the real treasures for which the mound was built were not discovered nor even dreamed of. In many such cases, doubtless, the mounds have since been leveled down, and their exact locality being forgotten, the opportunity of exploring them is lost forever.

At about the time already referred to, 1867, attention began to be turned in the direction of this research. Some discoveries were made of quite a different character from anything known of the habits of the modern Indians, and gradually it was learned that a distinction must be made between the Indians and the people, evidently of an earlier period, who had left these lasting memorials of their greater industry. As nothing was known of them to warrant the use of any descriptive or national name, the very safe appellation of "Mound Builders" was, by common consent, adopted.

During the last decade every year has added something new and strange to the silent testimonials of the lives, the labors, and the vast numbers of that mysterious people, whose very memory had utterly passed from the face of the earth.

From these relics a great deal has been learned regarding the habits of this people, and a wide-spread and intense interest awakened, and it is not too much to say that our Academy has contributed a fair share toward this result.

Though the knowledge consists chiefly of a disjointed, incoherent mass of facts, scarcely sufficient even now to warrant the enunciation of any very complete theory regarding them, yet sufficient data have been accumulated to justify some pretty strong inferences, in most of which, probably, nearly all persons at all familiar with the subject will concur.

The Mound-Builders were very numerous throughout the Mississippi valley. They dwelt mostly, if not exclusively, in the neighborhood of the rivers. They were a people entirely distinct from the North American Indians, as we know them, had occupied the country in much earlier times than the latter, and were entirely unknown to them, even by tradition.

Like the modern Indians, they were of different tribes, but less warlike and less nomadic, more domestic in their habits, yet their

dwellings must have been of the most imperfect and perishable character, no traces of them being found.

They practised cremation, though but to a limited extent, and only upon great and unusual occasions.

They lived in a very simple manner, possessed few mechanical contrivances, but were a laborious, pains-taking people. That they had some system of barter with neighboring tribes at least, (though perhaps limited to mere occasional exchanges as opportunity offered) is shown by the occurrence in the mounds of large sea shells, which, at the nearest, must have come from the Gulf of Mexico; obsidian from the far west; mica, not to be found in this region; galena, etc.

Copper was evidently a rare and highly valued article among them; its rarity seems to indicate that they did not work the copper mines of Lake Superior or anywhere, and were not much in communication with any people who did.

Small nuggets of drift copper are still occasionally found here, we have several in our museum, picked up in this vicinity; and a numerous people, dwelling here for a long period, would be likely to find the greater portion of all such specimens existing here, and if they did so, that would furnish a quite sufficient source of supply of material for all the copper relics yet discovered, without the necessity of drawing upon the mines. That the mound-builders had no knowledge of the art of smelting is well shown by the following facts:

The numerous copper axes, awls, beads, etc., and the very rare silver ornaments are evidently of the pure native metal, and *hammered*, none are found bearing the slightest indications of having been melted; no molds or crucibles, or fragments of any have ever been found, although they would be of the most imperishable character, even more so than the pottery which is exceedingly common.

If cast in molds, many would be made of identical size and form, whereas no duplicates are ever found.

If, as has been argued, though I believe on insufficient grounds, the copper implements collected in Wisconsin exhibit indications of having been formed in molds, it would have no bearing whatever upon the origin of those of Iowa, which are of a very different type; those of the north being mostly of the more modern forms of spears and knives; and not usually found in mounds, but scattered on the surface or in the shallow Indian graves.

The copper "axes," so called (and very inappropriately, too) in no

instances show any indications of having been put to any use as tools, or even of having had handles attached. They were probably valued and kept as badges of rank or wealth, and held in high esteem.

Those people undoubtedly smoked tobacco, not, however, as a recreation or habitually for pleasure, but as a kind of ceremonial observance. The pipes are often very elaborately and beautifully carved out of a great variety of kinds of stone, generally of a rather soft character, and were apparently held in very high estimation, perhaps almost sacred. They are all, in the Upper Mississippi Valley, of the same general type, having the flat, curved base, which is perforated to serve as a stem and not at all adapted to retain in the mouth for smoking continuously, which fact, with the smallness of the bowl itself, would indicate that it was to be used by passing from one to another of the persons assembled.

They represent a great variety of animal forms, some difficult to determine, but among them are two, well and distinctly representing the elephant, though differing somewhat from each other in form and position.

These plainly and unmistakably show that the sculptors were acquainted with the elephants, (the mammoth or mastodon) of which, though long extinct, numerous remains are found throughout this country.

Strangest of all, and most contrary to the opinion of archaeologists hitherto, it now appears that *the mound builders had a written language*. Whence derived, or what its origin, is matter of the merest conjecture. What were its affinities, or whether it had any connection with other written languages, ancient or modern, no one has as yet been able to determine.

The inscribed tablets in our museum, the only ones of much significance or importance perhaps, which have as yet been discovered in the mounds, have attracted much attention both in this country and in Europe, and by all eminent and well informed archaeologists, are considered of the highest importance. They are certain to stimulate research, which will doubtless lead to further discoveries, until it may well be hoped that the key to the language may ultimately be discovered, and something of a history of this ancient people may be made out as written by themselves.

Whether the language was understood by all, or only by a more learned few, or whether these tablets were heirlooms and cherished relics, can now be scarcely even guessed.

A rather significant circumstance, perhaps, is the fact that in the same mound with the two tablets first found were the bones of a young child, partially preserved by the contact of a large number—about 300—copper beads, indicating it to be an important personage, and that persons of high rank were buried there.

Some doubts of course have been expressed regarding the genuineness of the tablets, though not to any great extent by competent and candid archaeologists, and we feel no uneasiness on that account.

The tablets have been sent to the Smithsonian Institution for examination, and were retained there and subjected to the most thorough scrutiny for two months, during which time the National Academy of Sciences held its meeting there, and the heliotype plates of them were obtained under the direction of Prof. Baird himself.

They were also exhibited throughout the sessions of the meeting of the American Association for the Advancement of Science at Boston last August.

Any author or other person who cared to inform himself of the facts, has and has always had ample opportunity to do so, and would at once see that the circumstances of the finding were such as utterly to preclude all possibility of fraud or imposition.

The evidence that they are coeval with the other relics, that is, that they were inhumed with them and before the mound was built, is ample and conclusive and will be so considered by any unbiased man.

No pre-historic relic ever found has better evidence to establish its genuineness than these, and not one suspicious circumstance in connection with them has been pointed out, nor can there be.

We shall confidently hope for and gladly welcome further discoveries by whomsoever made, tending to throw more light upon this still obscure and intensely interesting problem of our earliest predecessors on this continent.

Among the principal additions to this department of the museum since the last annual report, have been fourteen mound-builders' pipes, three copper axes, and a number of other relics from the mounds, secured chiefly by the untiring exertions of our honored associate, the Rev. Mr. Gass, who has spared no time nor labor, and who has recently presented his report of the exploration of 75 mounds within the year, only one fifth of which afforded any relics for the museum, though the investigations are always instructive, and many facts are thus learned.

Beside his gratuitous labors and personal expenses borne by him-

self, about \$70 made up by private contribution has been expended for hired help in opening the mounds; the results have been highly satisfactory and this important work should be continued, and if possible, better provided for by some regular appropriations. The time is rapidly passing during which the opportunity for such researches in this vicinity will remain.

We have also received, as the product of the persistent enthusiasm of Capt. W. P. Hall, about 1,100 ancient stone and flint implements, and 150 vessels of ancient pottery, the latter having been exhumed by his own hands from the mounds and ancient burial places of the lower Mississippi Valley.

Our collection of mound relics now consists of the four inscribed tablets, 32 mound-builders' pipes, 25 copper axes, 300 copper beads, 14 copper awls, and a great number and variety of other relics from the mounds of this region, constituting the most extensive, rare and unique collection of its kind in this country, and probably in the world.

Besides these, this department contains 225 vessels of ancient pottery, over 1,000 stone implements, and 10,000 of flint, also about an equal number of broken ones and fragments worth preserving.

In the department of Natural History, except in Entomology, Botany and Conchology, we are deficient in workers, and in especial want of an expert taxidermist, and much that might readily be, and would be obtained, is lost to us for want of means of preserving specimens in a proper manner.

In Geology and Paleontology, under the especial attention of Prof. Barris, good progress has been made during the year in local investigation and discovery of new species, and preparation of material for papers for publication whenever the opportunity for publishing is presented.

The collections have also been enriched by additions by him and other contributors.

In Mineralogy some valuable contributions to the museum have been received, and this department of the exhibit is now a very attractive one.

The collection of historical relics is constantly increasing, as the possessors of such objects throughout the community gradually come to realize the greatly enhanced value of these articles when collected together in a suitable place and accessible to the public.

The Library is steadily increasing by exchange and contributions,

with very few additions by purchase, and has thus far grown somewhat beyond our expectations. It now contains 2,600 volumes, over 1,000 of which are bound, and many of them very valuable works; also over 500 pamphlets; all this exclusive of duplicates. In addition to these there are on deposit belonging to several members, 900 volumes, making 4,000 volumes and pamphlets available for the use of members, exclusive of about 1,000 city dailies and other newspapers.

At the very beginning of the year, the second part of Vol. II, of our proceedings was completed and a portion of the copies have been distributed, thus keeping good and increasing our list of exchanges in this country and in Europe.

MEMBERSHIP.

As shown by the Secretary's report, the increase in number of members has been greater during the past year than for several previous years, and we now number 161 regular members, and 63 life members.

And I might mention here that the number of visitors during the past year, actually counted, including members, is 8282.

THE FINANCES

of the Academy as shown by the Treasurer's report are considerably improved within the past year and may be considered in a healthy condition.

While we are not yet out of debt, the amount has nevertheless been diminished since the last annual report by \$505.76, leaving still due \$1,467.49; and the progress made is a hopeful indication that ere long it will be entirely extinguished, and the Academy will be free to devote its entire income, after the payment of current expenses, to the necessary improvements in the building, and to the requirements for making and properly preserving the Natural History collections which are simply awaiting such provision.

We have, during the year just past, lived within our income, and all the cash contributions received, including Life Membership fees, have been devoted to the liquidation of a portion of our indebtedness. This, I think, shows that all funds have been carefully and economically applied.

It will probably not be many years before it will be found advisable to increase the amount of the annual dues of members, as the present unparalleled small fee of \$2.00 per annum is quite disproportionate to the magnitude of the Museum and Library, and to the value of the privileges of membership.

It will probably also be expedient, as soon as the debt is entirely paid to raise the fee of Life Membership to double its present amount.

SPECIAL NEEDS.

Among the immediate needs of the Academy, I would mention that of the contemplated permanent cabinet cases, and as, through the liberality of Mr. J. D. Putnam, his magnificent entomological collection is now placed at the disposal of the Academy under suitable conditions, it is of the highest importance that the proper cases for that collection should be provided first of all, and without delay.

We need a permanently established publication fund, the importance of which has been well set forth in the report of that committee.

We need a book fund, for the occasional purchase of an important work which cannot be otherwise obtained; and for binding many volumes and charts which can scarcely be well preserved or conveniently used unbound.

Also a special appropriation, or provision in some way, for a fund for the prosecution of mound explorations, that the burden of this important work, which has contributed so largely to our success, may not fall almost wholly upon one member, with only such aid as may be obtained by special solicitation.

I am strongly inclined to the opinion that the financial ability of our officers and members, with the devotion to the cause which has been manifested and the experience already gained, should ere long secure the adoption of some plan by which these objects shall be accomplished.

In the first Presidential valedictory—by Dr. Parry in 1869—are some remarks to which, from our present stand-point of an experience of thirteen years, it is rather interesting to refer. He says: "The particular need of such an institution, especially in its early stages of growth, is a *permanent location*, where its objects can be properly displayed, and affording room for necessary enlargement. We have a name, and a good one; we want a local habitation and *where* shall we find it?"

That question, as you all know, has been answered by the munificence of a wealthy lady among us, Mrs. P. V. Newcomb, the "Davenport Peabody," whose advent the Dr. probably hoped for only in a more distant future; and the location being thus determined, the Doctor's further suggestion of "the plan of life membership, as the most feasible", was carried into effect, and a building well suited to its purposes was erected. This building, with the addition of the

proper cabinet cases now much needed, will answer our purposes very well for some time to come, and it seems to me wisest to utilize it as completely as possible before entering upon the undertaking of completing the final structure.

Another suggestion which Dr. Parry strongly urged, that it would be "very desirable to commence the issuing of publications and transactions as early as possible" has also happily been put in execution, chiefly through the arduous labors and persistent energy of our worthy Corresponding Secretary and Chairman of the Publication Committee, Mr. J. Duncan Putnam, and the result fully demonstrates the wisdom of the recommendation, as well as its practicability, concerning which latter point considerable doubt was expressed.

One other remark I would call to mind. He said: "When such collections (in natural history, etc.,) are once fairly commenced, the peculiar individual tastes, or even the accidental biases of different minds, will be attracted to the various branches of science so exhibited, and we shall see, gradually growing up under its influence, *workers* prepared to follow out particular lines of research and investigation."

This also has been realized to some extent—would it were to a much greater.

The question, who are to take the places of the *active* members as they drop off, one by one, and even to swell the list to a more efficient force, is one which occasions some solicitude.

To attain any great degree of success, an institution of this kind, unless richly endowed so as to be enabled to command the best ability by good salaries, must depend upon amateur work, and upon the support of the community.

To secure these, it must not only contribute something toward the culture of taste and increase of interest in natural science, by museum, meetings, publications, and occasional lectures, but should also devise some means of instruction in the scientific subjects of most direct importance, and in the form most practically adapted and applicable in daily life.

Though some efforts have been made, we have not yet found the way in which to co-operate with the public schools as was always desired and hoped, and as we still hope to do.

In the Presidential address of Prof. W. H. Barris, four years since, I find the following very important suggestion, which, I am sorry to say, has not yet been realized, though I believe it can be. He says:

"I would suggest whether in each of the Sections, especially in those that as yet have attempted little, there might not be founded schools of instruction, where especially the younger members might regularly secure such practical instruction from the lips of the living teacher as shall qualify them for efficient, practical work. In each section might be found some one willing in this quiet way to further the interests of the Academy."

This is a subject which now it seems to me demands our most serious attention, and should be delayed no longer. Whatever can be done in this direction can be effected without interfering with the other necessary work of the Academy, and would probably aid in such other work, especially that of the section itself. One good beginning was made—Dr. Parry's class in Botany—and its success while continued is certainly very encouraging for future efforts.

Our experience has abundantly shown that the chief element of success is *work*.

Work outside in collecting and exploring, and also in securing the necessary pecuniary aid. *Work* in the building, cleaning up specimens, restoring those that are broken; classifying, comparing, studying, arranging, labeling and registering. *Work* at the microscope, *work* at the steel plate, *work* at the proof sheet; indefatigable, persistent labor, in spite of daily cares constantly pressing; undeterred by physical weakness and poor health; undismayed by any little disaffections; unoffended at any difference of opinion as to the policy to be pursued; always keeping in view the grand object of "the increase and diffusion of knowledge," and the promotion of the interests of the Academy as a means to that end.

This, seconded and made practicable and successful by the far-sighted liberality of public spirited citizens and distant friends, in responding to appeals for the aid and support without which such an enterprise must ultimately succumb; has enabled us to escape the fate of most similar enterprises.

And we feel that all this labor has not been in vain; that something has been accomplished well worth all the effort and sacrifice which it has cost, and that our cherished institution is deeply rooted in the hearts of the community, and in the favorable estimation of the world, and that we may well feel encouraged with the certain prospect of its continued and increasing prosperity and usefulness.

The following officers were then elected for the ensuing year:

President—J. Duncan Putnam.

First Vice President—C. H. Preston.

Second Vice President—C. E. Harrison.

Corresponding Secretary—C. C. Parry.

Recording Secretary—Lucy M. Pratt.

Treasurer—Charles E. Putnam.

Librarian—Julia E. Sanders.

Curator—W. H. Pratt.

Trustees for Three Years—C. C. Parry, W. H. Barris, J. Gass, W. H. Pratt.

Trustee for One Year (to fill vacancy) —H. C. Fulton.

With a few brief remarks the retiring President resigned his position to the President elect who thereupon took the chair.

JANUARY 21ST, 1881. —ARCHÆOLOGICAL SECTION.

Mr. W. H. Pratt in the chair. Three members present.

A communication to the Trustees of the Academy was adopted, asking for an appropriation in aid of mound explorations.

JANUARY 28TH 1881—REGULAR MEETING.

The President, Mr. J. D. Putnam, in the chair. Twenty members present.

Mr. H. H. Andresen, Mr. H. H. Smith, Mr. A. F. Williams, and Mrs. Wm. Renwick, of Davenport; and Mr. J. C. Kinsey, of Cambridge, Ill.; were elected regular members; and Dr. C. F. Kellogg, of Charlotte, Iowa, was elected a corresponding member.

The President announced the following *STANDING COMMITTEES* for 1881:—

Finance Committee—C. E. Putnam, chairman *ex-officio*, R. D. Myers, E. H. Hazen.

Furnishing Committee—Mrs. C. E. Putnam, Mr. C. E. Harrison, Mr. C. T. Lindley.

Library Committee—R. J. Farquharson, C. T. Lindley, Miss Julia E. Sanders.

Museum Committee—W. H. Pratt, C. C. Parry, W. O. Gronen, J. Gass, W. H. Barris, D. S. Sheldon, R. J. Farquharson, C. T. Lindley, J. D. Putnam.

Mr. Pratt made some remarks upon the subject of "a fourth dimension in space," so called, and gave extracts from published writings by Prof. Zollner of Leipzig, Prof. Simon Newcomb, Mr. Halsted and others. He explained the meaning of the "three dimensions in space" and showed the utter inconceivability of a fourth dimension. He then proceeded to present a different hypothesis by which certain physical phenomena, indicating the temporary suspension of the property of impenetrability of solid bodies, might be accounted for, and referred to several well known facts which seem to point toward such a possibility.

FEBRUARY 4TH 1881—GEOLOGICAL SECTION.

Prof. W. H. Barris in the chair. Three members present.

Prof. Barris presented a collection of sixteen species of fossils from the coal measures of Elk Falls, Kansas.

FEBRUARY 25TH—REGULAR MEETING.

The President, Mr. J. D. Putnam, in the chair. Twelve members and several visitors present.

A resolution was adopted adding the following article to the By-Laws:—

ARTICLE XI.—PUBLICATIONS.

Section I. The regular publications of the Academy shall consist of PROCEEDINGS in octavo and the Memoirs in quarto.

The PROCEEDINGS shall contain such original papers, presented to the Academy and accepted by the Publication Committee, as may be conveniently published in octavo form, together with such extracts from the Records of the Academy as the Publication Committee may consider of sufficient interest to print.

The Memoirs shall contain such papers as, on account of their size or illustrations, can best be published in quarto form.

Section II. The Publication Committee shall fix the price upon the various publications of the Academy, at which they shall be sold to members and the general public.

Section III. There shall be established a permanent publication fund, the principal of which shall be invested in safe, interest-bearing securities, and the interest only, used. Any person contributing not less than \$50.00 to this fund shall be entitled to all volumes of the Proceedings issued thereafter for life, and any person contributing not less than \$100.00 shall be entitled to all publications of the Academy issued thereafter for life.

The following paper was presented:

Notes on Our Local Geology—No. II.

BY PROF. W. H. BARRIS.

The discovery of a well preserved and graceful form of life characterizing the ancient flora of the coal measures is a welcome event to the student of paleontology.

If found detached from all its ordinary surroundings, translated into another and entirely different geological horizon, having its home at the base or below the well known Hamilton Group, a still greater measure of interest attaches to its discovery.

During the past summer Mr. Wm. A. Elmer, one of our College students, collected several fragments of a sea plant which, even as fragments, naturally awakened considerable curiosity. At his request and in company we visited the locality in which they had been found.

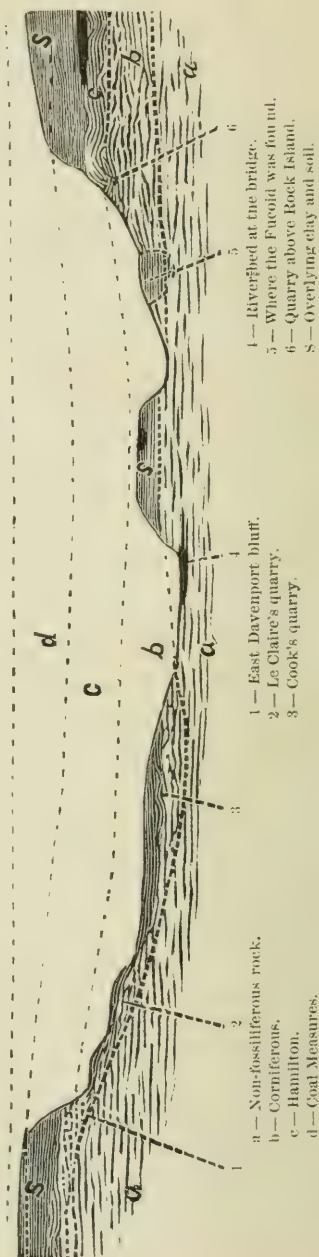
The quarry was not in a hill-side but on a dead level. It had been exposed by simply stripping a foot or two of earth from its surface. An excavation had then been made in the rock, measuring in length over a hundred feet, in breadth twenty or thirty, in depth ten or twelve feet. In the progress of their labors the workmen had encountered a bank of clay crossing the quarry diagonally about four feet wide and extending downward the whole depth of the quarry. On its roughened floor could be traced the course of this *dyke* of clay, while in the wall on either side marking its ingress and egress, and done in fine blue clay, was a well defined cross section of its height and breadth. Selecting that side which seemed to promise the most favorable results we commenced work. Beginning at the surface and digging into the bank, we purposed to enter it at such an angle that, by the time we reached the bottom of the quarry, we should have exposed a level space of three or four feet square. There was little to distinguish the first foot or two from ordinary earth; if anything, a gradual change in color shading from yellow to blue. The next few feet revealed a more uniform, consistent character of tough blue clay; nothing in it as yet to indicate any foreign material. At the last the clay became still more tenacious, of the consistency of what is termed "fire clay," and charged with more and more of arenaceous matter. The layers bore every appearance of being deposited in quiet waters, while their surfaces were occasionally mottled by an extended film of carbonaceous substance, yet so poorly preserved we could trace no distinct intimation of organized life.

Within a foot of the layer in which the Fucoid was found, the remains of a fish were discovered. These are preserved in the same case with the Fucoid. The fine sand that had been disseminated throughout the clay, all at once became an indurated sand rock, varying from two to three inches thick, extending over the whole space we had uncovered, its under surface completely covered by the Fucoid. Beneath this was a layer of soft blue clay, into which the plant had no doubt fallen, and which, having never hardened, had protected its entire surface. It is most probable this under clay formed the original surface on which the plant grew and into which having fallen, it was preserved in a form almost as faultless as it had when a thing of life.

As an extension of the same sand rock and fossil, Mr. Elmer procured a specimen as large as the one figured, having been joined to and forming part of it, both together constituting but a part of the entire plant. Bailey Davenport Esq., the owner of the quarry, presented to the College still another fragment, equalling in size and beauty that in the possession of the Academy.

In determining the source of this bed of clay, and tracing the manner of its transportation to its present locality, I have prepared the following diagram, representing a somewhat generalized section on a curved line across the valley and river, from bluff to bluff.

At *a* is shown the place of the non-fossiliferous rock common to each locality. It is with this we are most famil-



iar. It crops out on the banks of the river both above and below the city. Extending across the river from bluff to bluff, and as far west as Cook's farm, this is found but a comparatively short distance below the surface of the ground. Whatever may be said of other rocks we are about to notice, one thing is settled; this is continuous and forms the solid basis on which the others all rest.

In upward succession, resting on this non-fossiliferous rock just described and represented by *b*, we found a rock abounding in fossils. Within the past two years it has been exposed at Le Claire's quarry, being three or four feet thick; at the quarry between Rock Island and Moline, assuming a greater thickness; while in Cook's quarry it is represented by certain layers found at neither, and attaining twenty feet in thickness. It is from this rock that the Corniferous fossils described in the last volume of the publications of the Academy were gathered. As at that time, so now: no traces of any of these fossils are found in the ascending beds.

This rock differs from those above and below it, not only in its fossiliferous contents, but is a pure carbonate of lime, and has been extensively burned for quick-lime both in the quarries between Rock Island and Moline and at Cook's quarry below this city. By some immense power of which we may speak hereafter, it has been broken up and removed over the area where it had been originally deposited; and with the exception of its forming the bed of Rock River as far as Milan, it is only found *in place* in the three quarries designated.

In their natural ascending order we next have the brown Argillaceous shales and gray and brown lime-stones of the Hamilton Group, (these are denoted on the diagram by the letter *c*; at present they are only found in place at the quarry between Rock Island and Moline) exhibiting, in the face of the cliff, a thickness of between twenty and thirty feet. They are not found either at LeClaire's or Cook's quarries, nor are their equivalents found in our vicinity, the rocks at Buffalo being simply their upward extension. As in the case of the preceding rock *b*, so it is in this; at one time there is not the slightest doubt that they occupied the whole distance over the area we are considering, and everywhere resting immediately on the hard calcareous rock, represented by *b*.

Next above this formation, in natural ascending order should come what are called the Coal Measures—*d*. These no doubt were co-extensive with and resting immediately on the Hamilton. Of these no

traces exist in place in our immediate neighborhood. Yet they are found as outliers extending within a short distance from Le Claire, furnishing, in places, seams of coal that have been workable. We find similar outliers at Buffalo, from which coal has been brought into our city. These separated Coal Measures are but the extension of the Illinois beds; and all of them the deposits of an ancient sea. And in passing, I suggest whether they may not be represented by what has been called the "Carboniferous drift," from which Prof. Pratt has collected some fine fossils, and in reference to which he has prepared a paper for the Academy (see page 106).

I come now to an interesting question: By what process does a plant of the Coal Measures, of large size and delicate structure, find its way down through the whole thickness of the shales and limestones of the Hamilton; the twenty feet of solid limestone, the repository of all Carboniferous fossils so far found; and still lower through twenty feet further of the non-fossiliferous rock below; or in other words, how is it transferred from *d*, to *5*? This is the problem to be solved.

The researches of Prof. Hall will materially aid us in comprehending something of its nature. In his Geology of Iowa, he has given several diagrams to show that the huge cavities so often found in the Hamilton and the Helderberg, are found filled with the blue shale of the Coal Measures. One of the most remarkable instances of the kind occurs in the face of the quarry between Rock Island and Moline.

We are presented with what was once an immense cavity in the rock, connected by a long neck or tube extending through to the earth which overlies it, becoming thus the medium of communication with the Coal Measures. It is filled with a deposit of clay entirely different from anything in the Hamilton, and, moreover, contained the cast of a shell distinct from any known in the surrounding rock, very similar to a carboniferous form. This same clay, I have shown in a previous paper read before the Academy, is found in Cook's quarry; and this same clay is that from which our plant was exhumed. If no other theory presented itself, we might be necessitated to resort to this to account for the occurrence of the clay in the quarry we are considering. I suggest such slight modification as will adapt it to the case in hand.

What are the ordinary phenomena that now meet the eye as we look from bluff to bluff across the river? Is it not the entire disappearance of all the rocks that once filled up the whole area? The

power that could have wrought a denudation so vast as to sweep away the superincumbent mass of shales, limestones and solid rock, is beyond our conception; and yet it is this power that makes the future Mississippi River a possibility.

Supposing now that before the time of the Coal Measures, a denudation of such magnitude has swept away (just as we see it now) all trace of the Hamilton, except in the cliff between Rock Island and Moline; all trace of the still lower fossiliferous rock; extending down still deeper, until, in the non-fossiliferous rock, it has unroofed one of the ancient subterranean water-courses in which it abounds. Everything is now ready for the waters of the Coal Measures; and the same sea that fills the cavity in the Hamilton in the quarry between Rock Island and Moline, is brought into direct contact with this old water-course, thus furnishing the material with which it was filled.*

I have already, in a preceding page, spoken of the layers that composed the clay in which the fucoid was imbedded, that there was every evidence of their having been deposited gradually and in quiet waters. That this plant could have floated from some other position and simply been swept into the locality where we now found it, seems scarcely possible when we consider the peculiar condition and quiet repose in which it is found. The portions now in our possession give us but an inadequate idea of the beauty and delicacy of structure characterizing the extremities of the plant. The sandstone had gradually thinned out until it graduated into the soft blue clay; and for several inches upon this blue clay, could be traced the finer, more attenuated and delicate impressions of its branchlets, but the clay was so fragile, it was utterly impossible to preserve them.

There was no confusion; no folding of part on part; no botanist in his herbarium ever arranged his treasures with more exquisite taste

* Note. Since writing the above, I have been informed by Mr. Pratt, of the existence of several small patches of rocks of the Coal Measures, over the area referred to. They exist, not in the form of soft shale, but of hard, dark grey, iron-stained sandstone, filled to repletion with fragments of coal plants. One of these, at the government bridge, exposed in excavating for the draw pier, and on which the pier rests, is especially note-worthy as apparently belonging to a bed of some extent. The river bed at Moline also exhibits the same rock.

The existence of these patches in so many places, resting in all cases upon the partially denuded portions of the non-fossiliferous rocks, can only be accounted for on the complex theory of—first; the total disappearance of the Hamilton shales and limestones, and—secondly; after such erosion, the inundation of the Coal Measure seas over the same area.

and care, for the purpose of presenting and preserving their finer features.

And hence we conclude that in this rock, channeled out and made ready for its reception ages beforehand, and at the depth of eight or ten feet below its surface, this plant lived and died, protected from that hour to this by its high walls of massive rock. Can we conceive of a fitter mausoleum for its reception and preservation than this, and built by no human hand?

And just as in the instance before, another denudation as extensive as that which preceded it, has swept all the rock of the Coal Measures away, so that today, with the exception of a few feet upon its surface, the rocks here are just as they were at the close of the Coal Measure period.

This paper aims to bring out the following points:

1. The fact of a fossil plant of the Coal Measures occurring in and, most probably, far below the well recognized horizon of the Hamilton.

2. The thorough identification of the blue clay with that of the Coal Measures. The probability of such relationship was favored by the presence of the cast of a shell of Carboniferous form (see Hall's Geology of Iowa, Vol. I, p. 130). Its certainty may be considered established, as the fucoid is characteristic of the same great era.

3. The existence, in place, at LeClaire's quarry, of the hard fossiliferous rock, as an extension of the same rock hitherto only found at the quarry between Rock Island and Moline, and Cook's quarry.

4. It suggests the possible origin of what has been known as the "Carboniferous drift" in our vicinity.

Just as the far-famed obelisk, transplanted on our shores, speaks to us of a past civilization and art, so this plant, a marvel of beauty, coming to us from the far-off Coal Measures, gives us a faint glimpse of the sculpturesque forms of life and grace that once floated in their seas, ages and ages ago.

MARCH 25TH—REGULAR MEETING.

The President, Mr. J. D. Putnam, in the chair. Nine members present.

The following paper was presented:

Contributions to the Flora of Iowa--No. IV.

BY J. C. ARTHUR.

The activity of resident collectors in extending the state flora has greatly increased since 1876. The quality of the specimens sent has also improved, as well as the liberality with which they are provided for determination or verification.

It will be seen by the localities in the following list, that the different portions of the state are quite fairly represented, except the three southern tiers of counties west of the immediate vicinity of the Mississippi. This large section when explored, will give a long list of additions. All the western border of the state may be expected to yield many very interesting species which do not extend further east; while no locality in the whole state yet seems to be exhausted.

The names of the present list are for the preceding two years. The specimens for them have been furnished by the following persons, to whom I am wholly indebted for the material for the present report: John Leiberg, Seney, Plymouth Co., M. E. Jones, Grinnell, Mrs. M. C. Carter, Hesper, Winneshiek Co., E. W. Holway, Decorah, Geo. D. Butler, late of Almont, Clinton Co., Fred. Reppert, Muscatine, Dr. Geo. E. Ehinger, Keokuk, R. Burgess, Ames, Dr. J. J. Davis, formerly of Vinton. A specimen of No. 544^a is in the Harvard Herbarium at Cambridge, communicated by Dr. Vasey.

51^a *Nasturtium officinale*, R. Br. Decorah.

65^a *Arabis perfoliata*, Lam. Vinton.

84^a *Viola lanceolata*, L. Muscatine.

90^a *Viola pedata*, L., var. *bicolor*, Pursh. Muscatine.

124^a *Talinum teretifolium*, Pursh. Lyons Co.

237^b *Geum macrophyllum*, Willd. Clinton Co.

244^b *Potentilla tridentata*, Ait. Hesper.

247^a *Rubus triflorus*, Rich. Hesper.

299^a *Archemora rigida*, DC., var. *ambigua*, T. & G. Kellogg and Vinton.

302^a *Thaspium aureum*, Nutt., var. *apterum*, Gr. Grinnell.

306^a *Berula angustifolia*, Koch. Sioux Co.

338 *Galium circæzans*, Michx. Keokuk.

404^a *Silphium trifoliatum*, L. Clinton Co.

- 457^a *Artemisia serrata*, Nutt. Mason City and Grinnell.
 469^a *Senecio lugens*, Rich., var. *Hookeri*, Eaton. Plymouth Co.
 493^a *Mulgedium pulchellum*, Nutt. Ames and Grinnell.
 511^a *Plantago Rugelii*, Dec. Ames and Grinnell.
 519^a *Anagallis arvensis*, L. Keokuk.
 520^a *Utricularia biflora*, Lam. Muscatine.
 544^a *Gerardia tenuifolia*, Vahl., var. *macrophylla*, Benth. Council Bluffs.
 545^a *Gerardia flava*, L. Clinton Co.
 596^a *Lamium amplexicaule*, L. Keokuk.
 619^b *Cuscuta inflexa*, Engelm. Grinnell.
 620^a *Cuscuta Gronovii*, Willd., var. *latiflora*, Engelm. Hesper.
 628^a *Datura Tatula*, L. Muscatine, Grinnell and Cedar Rapids.
 650^a *Acerates lanuginosa*, Dec. Plymouth Co.
 662^a *Chenopodium urbicum*, L. Keokuk, Des Moines, Nevada, and Grinnell.
 676^a *Polygonum hydropiperoides*, Mx. Grinnell, Plymouth Co.
 678^a *Polygonum Muhlenbergii*, Watson. Plymouth County and Muscatine.
 792^a *Habenaria hyperborea*, R. Br. Hesper.
 792^b *Habenaria Hookeri*, Torr. Hesper.
 796^a *Microstylis ophioglossoides*, Nutt. Decorah and Hesper.
 817^a *Veratrum Woodii*, Robbins. Burlington.
 826^a *Erythronium Americanum*, Smith. Hesper.
 829^a *Allium cernuum*, Roth. Plymouth Co. and Decorah.
 835^a *Juncus Vaseyi*, Engelm. Clinton Co.
 841^a *Commelyna Virginica*, L. Muscatine.
 843^b *Cyperus acuminatus*, Torr. Plymouth Co.
 850^b *Eleocharis obtusa*, Schultes. Keokuk, Kellogg, Clinton Co. and Plymouth Co.
 858^a *Fimbristylis capillaris*, Gr. Keokuk.
 861^a *Carex teretiuscula*, Good. Grinnell.
 885^b *Carex granularis*, Muhl. Clinton Co.
 892^a *Carex Richardsonii*, R. Br. Grinnell and Plymouth Co.
 893^b *Carex trichocarpa*, Mx. Grinnell.
 893^c *Carex riparia*, Curtis. Grinnell.
 903^a *Vilfa aspera*, Beauv. Ames, Plymouth Co.
 924^a *Aristida purpurea*, Nutt. Plymouth Co.
 925^a *Bouteloua oligostachya*, Torr. Plymouth Co.
 927^a *Eleusine Indica*, Gaert. Keokuk.

The following descriptions are of plants in this list not described in Gray's Manual, 5th edition.

ARTEMISIA SERRATA, Nutt.—Stem tall and herbaceous; leaves lanceolate, acuminate at either extremity, margin serrate, upper side smooth, under tomentose and white; flowers paniculate, partly glomerate, erect; calyx small cylindric-ovate, and nearly smooth.—Near the Prairie du Chien, on the banks of the Mississippi, also on the banks of the Missouri, in open alluvial soils. Stem 5-6 feet high. *Nuttall's Genera*, II, 142.

SENECIO LUGENS, Richards.—Perennial, white-tomentose, deciduously lanate or nearly smooth; stem $1\frac{1}{2}$ -2 feet high, often several from one root; leaves obscurely veined, 2-8 inches long, $1\frac{1}{2}$ -2 inches wide, the radical obtuse, narrowed into a petiole, cauline sessile and partly clasping; heads variable in size, usually rather large; involucre with a few bractlets at the base; scales linear-lanceolate, acute, with blackish-purple tips; rays 10-12, oblong-linear, twice as long as the involucre; achenia glabrous.

Var. *HOOKERI*, Eaton.—Deciduously tomentose or smooth; stem simple; leaves entire or glandular-toothed, the radical oblong-spatulate, cauline lanceolate, acute, clasping; corymb dense; scales of the involucre conspicuously sphecelate. *Flor. Col., Port. & Coul.*

PLANTAGO RUGELII, Decaisne.—Leaves paler than in *P. major*, commonly thinner; spikes long and thin, attenuate at the apex; sepals oblong, all as well as the similar bracts acutely carinate; capsules erect in the spike, cylindraceous-oblong (somewhat over 2 lines long, one-sixteenth inch in diameter), about twice the length of the calyx, circumscissile much below the middle; ovules 6-10; seeds 4-9, oval-oblong (about a line long), opaque and dull brown, not reticulated.—*P. Kamtschatica*, Hook. Gray's Manual, ed. 5, not of Cham. Canada to Illinois and south to Georgia and Texas; probably truly indigenous, as no trace of it is found in the Old World. *Gray's Synop. Fl. N. Amer.*

GERARDIA TENUIFOLIA, Vahl., var. *MACROPHYLLA*, Benth.—Stouter; leaves larger, $1\frac{1}{2}$ -2 inches long and almost 2 lines wide, scabrous; pedicels ascending; calyx-teeth usually larger; corolla little over $\frac{1}{2}$ inch long. Western Iowa to Colorado and W. Louisiana. *Gray's Synop. Fl. N. Am.*

CUSCUTA GROSSVIL, Willd., var. *LATIFLORA*, Engelm.—A form with flowers of more delicate texture, and shorter tube and longer lobes to the corolla.—*C. Saururi*, Engelm. in Am. Jour. Sci., vol. 43, with 5 figures. Common northward. *Gray's Syn. Fl. N. Am.*

POLYGONUM MUEHLENBERGII, Watson.—Perennial, in muddy or dry places, often 2-3 feet high, scabrous with short appressed or glandular hairs, especially upon the leaves and upper stems; leaves thin, rather broadly lanceolate, long-acuminate, usually rounded or cordate at base, 4-7 inches long, on short stout petioles ($\frac{1}{2}$ -1 inch long) from near the base of the naked sheath; flowers and fruit nearly as in *P. amphibium*, but spikes more elongated (1-3 inches long), often in pairs.—New England to Texas and westward to Washington Territory and N. California. *P. amphibium*, var. *Muhlenbergii*, Meisn. in DC. Prodr., and including most of the var. *terrestre* of American botanists. *Proc. Amer. Acad., XIV*, 1879.

ARISTIDA PURPUREA, Nutt.—Perennial; culms 6-15 inches high, simple, erect, slender, mostly glabrous; sheaths narrow, scabrous, exceeding the internodes, pilose at the throat; leaves very narrow, convolute, $\frac{1}{2}$ -10 inches long; panicle slender, erect or flaccid, 3-6 inches long, loosely few-flowered; glumes purplish, the upper one 6-9 lines long, about twice exceeding the lower, and longer than the flower, bifid and shortly awned; flower densely short-pilose at the base, scabrous above, 6 lines long, the awns equal or nearly so, separate to the base, not jointed, 1-2 lines long, scabrous.—From Western Texas and New Mexico to Arkansas and Colorado. *Watson in King's Rep.*

CORRECTIONS AND EXPLANATIONS.

Berula angustifolia (No. 306^a) is described in Gray's Manual under the synonym of *Sium angustifolium*. See Watson's *Bib. Index N. Am. Bot.*

For 422^a and 427^a of the "Contributions to the Flora of Iowa" for 1877 read 522^a and 527^a.

Gerardia setacea of "Flora of Iowa" (No. 545), and of Gray's Manual (not of Walt.) is *G. Skinneriana*, Wood. The true *G. setacea* of Walter is a Southern species. See *Syn. Fl. N. Am.*, II, 294.

Stachys palustris, L., var. *cordata*, Gr. (No. 596) should be changed to *S. palustris*, L., as the plant (common throughout the state) is the typical form, and not the variety. The var. *cordata*, is not likely to be found in Iowa: its range is much further south. See *Syn. Fl. N. Am.*

Lithospermum longiflorum, Spreng. (No. 605) is to be expunged from the "Flora of Iowa". The plant to which this name has been applied is only an early flowering state of *L. angustifolium*, Michx. The discovery of the identity of the two forms was first made by M. S. Bebb of Illinois in 1873. See *Amer. Nat.*, VII, 691. For the revised description of the species see *Gray's Syn. Fl. N. Am.* II, 205.

Physalis Virginica (No. 626) should be written *P. Virginiana*, Mill. See *Syn. Fl. N. Am.*, II, 235.

Some specimens remain over that have not been satisfactorily determined, for the most part because not complete enough. Among them are several interesting forms belonging to the genus *Astragalus*. It would be advantageous to have these reports made annually, and the only obstacle is the lack of material. Any information relating to the flora of Iowa will be gladly received; and every possible assistance will be rendered any person who desires to help in this work.

University of Wisconsin, Madison, Wis., December, 1880.

APRIL 29TH, 1881. — REGULAR MEETING.

The President, Mr. J. D. Putnam, in the chair. Fourteen persons present.

Messrs. W. S. Smith and L. R. Witherell were elected regular members. Mr. S. V. Proudfit, Glenwood, Iowa, was elected a corresponding member.

MAY 27TH, 1881. — REGULAR MEETING.

Mr. W. H. Pratt in the chair. Four members present.

Rev. J. Gass reported explorations of several mounds in Rock Island County, Illinois, obtaining two stone pipes, and stated that he would make a full report when he had made some further explorations.

The following paper was presented:

Exploration of Nine Mounds in Rock Island County, Ill., May 19th to 23d, 1881.

BY C. T. LINDLEY AND C. L. PRATT.

Under the instructions of the Academy, Messrs. C. T. Lindley, H. M. White, D. T. McDonough, W. H. Davisson, and C. L. Pratt went down the river, on the 19th inst, to a point in Illinois nearly opposite Fairport, for the purpose of investigating a few of the very numerous mounds in that district. We camped on the river bank, in the immediate vicinity of the mounds, and near the farm of Mr. Eli Martin.

The mounds are in several groups on the bluffs, which run along half a mile from the river, and these groups are pretty widely scattered. We first began the work upon a group containing five mounds, and lying on the bluff but a short distance east of Mr. Martin's house. Here we opened three mounds; but, although the search made was systematic and complete, our labors were rewarded only by the finding of a few bones in one of them. This one was constructed, seemingly, on a plan different from that employed in the others, being of soft, black dirt; while the others were of clay, and so hard as to require the constant use of a pick-axe.

Concluding that further search in this quarter would be fruitless, we adjourned to another group farther down the river, some two miles west from Mr. Martin's house, and comprising nine mounds.

Of these we chose such as appeared most likely to repay our efforts;

but, although we dug down into them to the depth of fourteen feet in one instance, and very deep in all cases; and although we worked in six different mounds, no encouraging indications were met with.

The ground was exceedingly hard, and composed of clay, which, though somewhat mixed, did not present any other evidence of ever having been disturbed, or of having been used as a burial place by the mound-builders. In one of them we found the bones of an Indian, buried near the surface; but beyond this, no bone or anything else but clay and roots was found, and we gave up the search.

JUNE 24TH, 1881. — REGULAR MEETING.

The President, Mr. J. D. Putnam, in the chair. Eleven members present.

Mr. W. J. McGee, Farley, Iowa; Prof. J. K. Macomber, Ames, Iowa; Prof. J. Henry Comstock, Washington, D. C.; and Mr. Tyler McWhorter, Aledo, Ill., were elected corresponding members.

SEPTEMBER 30TH, 1881. — REGULAR MEETING.

Prof. W. H. Barris in the chair. Five members present.

The following papers were presented:

Oxytheca.—Two New Species from Southern California.

BY C. C. PARRY.

OXYTHECA, a genus established by Nuttall, over forty years ago, on a plant then considered peculiar to the interior arid districts of North America, but which somewhat later, under different names, was also strangely met with in remote districts in the South American Andes, rested for a long time upon this single species (*O. dendroidea*, Nutt.).

In the more recent revision of the *Eriogonææ* by Torrey and Gray [Proceedings Amer. Acad. Vol. VIII, p. 190], the genus was confirmed by two additional species from the same interior districts.

Subsequently, in Vol. II, Botany of California, Mr. Sereno Watson completes the latest view of the genus by two other additions, making, in all, five species.

All of these, at different times, either as living plants or dried specimens, had come under the notice of the writer. It was therefore a matter of most agreeable surprise to receive from the enterprising botanical collectors, Parish Brothers, of San Bernardino, as some of the fruits of their labors during the present season (1881), two more remarkable new ones, thus enlarging the genus to seven species.

One of these, as will be seen from the following description, presents peculiarities that require an enlargement of the generic character, which is herewith presented, together with a complete list, and descriptions of the new species.

OXYTHECA, Nutt.; Watson, Botany of California, Vol. II, pp. 31-32. (The character extended in the *italicised* parts.)

Involucres few-to many-flowered, more or less pedicellate or sessile, campanulate or turbinate, herbaceous and not reticulated, mostly 3-5-cleft, the erect or spreading lobes generally terminated by straight, slender awns, or obconic-truncate and conspicuously ridged with numerous longitudinal radiating nerves, which are prolonged beyond the obconic tube into a fringe of somewhat unequal acicular awns. Flowers (6-parted), bracteoles, etc., as in Eriogonum. Akenes ovate-lenticular (where known); the elongated radicle acumbent upon the rounded cotyledons.

With the following species:—

1. *Oxytheca inermis*. Watson, Bot. Cal. Vol. II, p. 32, recently rediscovered by Mr. W. G. Wright, on San Bernardino Mountain.

2. *O. dendroidea*, Nutt.; Watson, l. c.

3. *O. Watsoni*, Torr. & Gray; Watson, l. c.

4. *O. trilobata*, Gray; Watson, l. c.

5. *O. caryophylloides*, n. sp.

Plant low (4 to 8 inches), with short simple primary stem, or branching from the base, upper stems prolonged into numerous slender, intricate branches, smooth or glandular-pubescent, with irregular patches of dark-colored glands on the upper stem and involucre; leaves radical, obovate, spatulate, occasionally emarginate, tapering into a petiole expanding at its clasping base; cauline bracts ternate with oblong divisions, nearly equal, one-half line long shortly acuminate; involucre (except in the lower axils) sessile, five-parted to near the base, divisions nearly equal, one and one-half lines long, narrowly ovate with strong mid-nerve prolonged into an awn about one-third its length; flowers two to three in each involu-

cre, shortly pedicelled and with very minute bractlets; perianth short, greenish, obscurely lobed, closely embracing the matured akenes; akenes broadly triangular, smooth, with rounded edges; embryo with curved radicle and orbicular accumbent cotyledons.

Habitat: San Bernardino Mountains. August, 1881, Parish Brothers, No. 1097, associated with the more conspicuous prostrate forms of *O. trilobata*, but readily distinguished by its smaller, more branching habit and sessile involucre, resembling in appearance some of the inconspicuous-flowered *Caryophyllea*, whence the specific name.

6. *Oxytheca Parishii*, n. sp.

Plant slender, sparingly and dichotomously branched, 6 to 18 inches high; radical leaves three-fourths to one inch long, obovate-oblong, minutely ciliate-denticulate, somewhat enlarged and subcordate at base, with a short thickened clasping petiole and distinct mid-rib; cauline bracts small, trifold, shortly acuminate, unilateral, with a connate sheath round the stem; stipitate glands conspicuous on the stems above the internodes; involucre on slender axillary and terminal pedicels (three-fourths to two inches long.), expanding into a short obscure tube conspicuously marked by longitudinal nerves, which are prolonged beyond the irregular margin into a diverging crown of slender acicular awns (18 to 28), somewhat unequal, about two lines in length, nearly twice the length of the involucre tube; flowers 5 to 14, pedicellate, unequally developed, the more mature reaching nearly to the summit of the involucre awns, the smaller usually staminate and abortive, with bracteoles of two kinds, one linear-spatulate, pubescent and ciliate, the other linear, about as long as the pedicels; perianth 6-cleft nearly to the base, divisions ovate, pubescent on the outside, smooth within; stamens 9, inserted at the base; akene lenticular, obtusely pointed, the small green embryo with long curved radicle and accumbent cotyledons.

Habitat: Ridge of San Bernardino Mountains. August, 1881, Parish Brothers, No. 993. The dried leaves when immersed in water exude a thick gelatinous mass many times their own bulk.

Dedicated to the discoverer and collector, Mr. Wm. F. Parish, of San Bernardino.

7. *O. perfoliata*, Torr. and Gr.; Watson, l. c.

Bones of the Mammoth in Washington Co., Iowa.

BY J. GASS AND W. H. PRATT.

Having observed some newspaper notices of large bones and teeth found in Washington County, Iowa, by Mr. Jerry Hoppin, we went down there on the eighteenth of July last to see what discoveries had been made.

We found Mr. Hoppin's farm on Section 14, Township 22, Range 3, and made a careful examination of the objects and the locality where they were discovered.

The remains consisted of the following teeth and bones of *Elephas primigenius*, — viz:

The two upper molars—beautiful specimens, very well preserved and nearly black. The grinding surface on each is eleven by four and three-fourths inches; and the greatest depth of the tooth, nine and one-half inches. To each of these teeth is still attached a portion of the jaw-bone, showing also a part of the socket of the tusk.

A fragment of a tusk, thirty inches in length and twenty-one inches in circumference. It is very much decomposed and falls to pieces rapidly. A considerable quantity of finely broken fragments was also found.

The atlas, absolutely perfect. The extreme width of this bone is seventeen and one half inches; its antero-posterior diameter, nine inches; articulating surface, ten by four and one-half inches.

Three other well-preserved vertebræ; one cervical, one lumbar, one uncertain; having an articulating surface of six and one-half inches diameter.

The left scapula, from which a portion is broken off. Its extreme length is thirty-four inches; greatest width of part preserved, twenty inches; articulating surface, nine and one-half by six inches.

One segment of the sternum, very perfect. Its dimensions are, length, eleven inches; depth, six and one-half inches; and width, four and one-half inches.

Head of femur, of hemispherical form, seven and one-half inches in diameter.

A portion of humerus thirty-six inches long, both extremities wanting, and the whole much decayed and very fragile.

One fibula, quite perfect, twenty-seven and one-half inches long.

Several fragments of ribs, one piece three feet in length, and some

of the pieces indicating the full length of a rib to be over five feet.

In addition there were a good many small, undeterminable fragments; though it is possible that, upon more extended examination of the whole, the true place of some of them might be ascertained.

These relics were discovered in a small stream running through the bottom land on the farm above mentioned.

The scapula was first found in the bed of the stream by Mr. Hoppin's boys while bathing. They at first took it for a piece of wood; but, upon discovering its true character, they made a search for more, and found several of the other bones within a few feet of the same place. Mr. Hoppin then continued the search by digging into the adjacent bank, and there found the teeth and several of the other bones.

All the bones were found within an area of fifteen feet each way in the black mud, (sedimentary deposit, chiefly of vegetable mold with some clay,) and about six feet below the surface of the level ground.

Mr. Hoppin contemplated making much more extensive explorations after the busy season should be past and when the creek would be likely to be dry. Whether he has done so, we have not learned.

We were very anxious to make some arrangements to secure these valuable relics for our museum; but it was impossible to do so, as he wishes to make all he can out of it, and was greatly in hopes of adding largely to the collection when he could continue the work.

We wish to express our appreciation of the kind treatment and hospitality shown us by Mr. and Mrs. Hoppin and family, with whom we took supper and spent the night.

OCTOBER 28TH, 1881.—REGULAR MEETING.

Dr. C. H. Preston, Vice President, in the chair. Eight members present.

Messrs. H. Stoltzenau, Muscatine, Iowa; Henry Dart, Rock Island, Ills.; and Chas. H. Hubbell of Davenport, were elected regular members.

NOVEMBER 25TH, 1881.—REGULAR MEETING.

Hon. Geo. H. French in the chair. Six members present.

The following papers were presented.

The Chambers Rod and the Phoenix Mill Fire.

BY W. H. PRATT.

The Phoenix Mill, corner of Western Avenue and Front Street, was destroyed by fire at the time of a violent thunder-storm on the night of Sunday, the 26th; and as it was provided with the Chambers Lightning Rod, it became a matter of especial interest to learn whether it was destroyed by lightning. If so, it would be the first instance of the kind, so far as we had ever learned.

Some time since I went to investigate the matter and learned from Mr. Pahl, one of the proprietors, that he had supervision of the premises at the time; and that the mill had been stopped for several weeks, for the purpose of making some additions and alterations, of which work he also had charge. He informed me that the rod had not been changed nor interfered with in any way, but remained just as it was left by the parties who furnished and placed it there.

It ran around the edge of the rectangular roof, enclosing an area of about fifty by thirty feet, and was about eighty feet from the ground, and high above all surrounding buildings.

The mill had been cleaned out so that there was certainly no considerable accumulation of dust in any part, and they were always especially careful that no grease should be dropped or accumulate anywhere, so that the idea of spontaneous combustion could not be entertained for a moment. Occurring as it did, in the midst of the storm of wind, lightning and heavy thunder, it was very natural to conclude that it was probably struck by lightning; but I wished to find direct evidence, one way or the other, if possible.

Examination of the premises could afford no clue, as the whole concern, lightning-rod and all, was engulfed in the fiery furnace very soon after the fire broke out.

Mr. Pahl told me that the watchman at Schrieker & Mueller's saw-mill close by, had seen the lightning strike the mill. I went and questioned the watchman, who seemed a very intelligent man, and he informed me that he was standing near the office door—he showed me the spot—in full view of the whole upper part of the flour mill at a distance from it of about 250 feet, with his face in that direction, and watching the play of the lightning in the heavens, when he saw a vivid flash across the sky before him, directly to the top of that building; and instantly, scarcely, if at all, separable from it in time

came the thunder crash. He was, of course, fully aware that the mill had been "struck." Almost immediately there poured forth from it a volume of smoke and then of flame, so that it seemed, as he expressed it, as if "it must have made a *big* hole" in the roof or walls.

We must probably be forced to the conclusion that the Chambers rod is, like all lightning rods, not infallible; and the rod on the Phoenix Mills must be placed in the category of failures. All experience seems to show that no lightning rod affords complete security against violent lightning discharges. Their chief usefulness, probably, is as equalizers, tending to the restoration of equilibrium of disturbed electrical conditions, and thus to prevent, modify or weaken the disruptive discharges. In this view there seems to be no good reason for assuming that the Chambers rod is useless. How many lightning discharges have been prevented by lightning rods, or to what extent they have been weakened, can of course, in the nature of the case, never be known.

It may be *assumed* that, to be at all efficacious even in this way, the rod must have a ground connection, but this, as I believe, is *not proven*, and some experiments apparently point directly to the opposite conclusion.

We very well know that every sharp point or edge of a conductor or a body in the condition of electrical tension, affords an opportunity for the escape of that tension, just as surely as that a hole in a hose filled with water at a high pressure allows a portion to escape, and thus diminishes the pressure.

From all experiments and investigations, as well as from theoretical considerations, it appears that the best security possible would be afforded to buildings by having *extensive* metallic surfaces, with many sharp edges, points and corners,—the larger the surface, and the more points and rough edges the better—whether connected with the earth by conductors or not; and this latter condition *may be* a matter of minor importance.

There seems to me to be no reason to fear that the rod increases the danger of injury by lightning under any circumstances. If it has any effect it must be to diminish the danger in a greater or less degree. Otherwise we must also condemn all metallic railing and ornaments which are so common on the tops of buildings.

An Artesian Well at Moline.

BY W. H. PRATT.

The Hon. S. W. Wheelock, Mayor of Moline and proprietor of the paper mill at that place, finding it desirable to procure purer water for the purposes of manufacture of printing paper than the river affords, and also at less expense for pumping, has recently bored an Artesian well close beside his mill and near the river bank.

The following is a section of the strata passed through, from the best data I could obtain:

Surface soil.....	7 feet.
Devonian limestone	113 feet.
Niagara limestone	275 feet.
Maquoketa shales	220 feet.
Galena and Trenton limestones	320 feet.
Sandy shales and streaks of sandstone	141 feet.
St. Peters sandstone.....	65 feet.
Red marl and limestone	316 feet.
Potsdam sandstone (supposed)	121 feet.
Limestone	50 feet.

At the depth of 53 feet they met with a cave in the limestone rock of the depth of 28 feet — its other dimensions of course unknown — and either empty or occupied by loose clayey material.

At the depth of 700 feet from the surface a vein of strong sulphur water was reached, which furnished a constant overflow in considerable quantity.

The whole depth of the well, measuring from the surface, which is eleven feet above low water mark of the Mississippi river at Daytonport, is 1628 feet. The bore is six inches in diameter for the first 80 feet, and from there down five inches. A six inch pipe was driven down past the cave above mentioned.

The well is now fitted with a pipe of four inches internal diameter, and an immense volume of the purest water rushes out with great force. It is clear as crystal, has a very slight mineral taste, and a temperature of 62, F.

The gauge indicates a pressure of 35 pounds to the inch, which is sufficient to raise the water to the height of 81 feet above the surface, giving a theoretical velocity of discharge of 72 feet per second. This, estimating a solid stream discharged through a pipe or nozzle of three inches diameter, (and the present discharge is probably equivalent to that) would give 1500 gallons a minute; but fric-

tion and resistance may probably reduce it one half or more. An approximation was made by measurement, giving between 500 and 600 gallons per minute, which would afford every inhabitant of Moline about four gallons an hour.

The Government reports give the elevation of low water mark at Davenport 553 feet above sea level, Lake Michigan 589 feet, and Lake Superior 609 feet. This well, then, will raise the water 26 feet higher than the surface of Lake Superior.

This opens to our view great possibilities for the water supply, not for Moline only, but for our own city; affording the purest article, in unlimited quantity, and without the expense of pumping, for the first ninety feet at least.

It should be mentioned that, in the limestone where the work terminated and down to the very bottom, there was a strong upward flow which brought up all the chips and cuttings made by the drill.

The chisel pulverizes the stone so completely that no chips are brought up of sufficient size to show well the nature and structure of the rock, and there is some doubt as to whether the true Potsdam sandstone has been reached.

Since the above was written, an analysis of the water has been made by Prof. Haines, of Rush Medical College, Chicago, as follows—the quantity of each constituent being represented in grains per standard gallon of 231 cubic inches:

Chloride of sodium	27.854
Sulphate of sodium	20.848
Carbonate of calcium	8.765
Carbonate of magnesium	5.849
Carbonate of iron	0.221
Silica	0.355
Organic matters	traces.
Total grains per gallon	63.892

“The hardness of the water, on Clark’s soap scale, is 11 $\frac{1}{2}$ degrees;—the hardness of Lake Michigan water as furnished at Chicago, is 5 $\frac{1}{2}$ degrees.

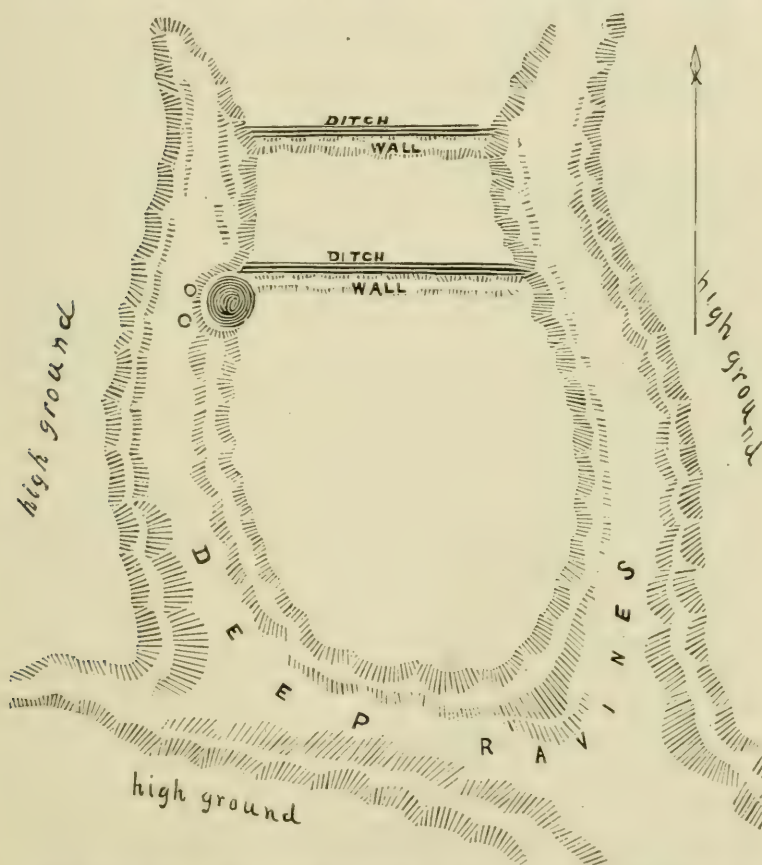
The water may be looked upon as fairly good for most purposes, despite the large amount of solids it contains, the greater part being readily soluble and harmless salts of sodium. For drinking purposes, its freedom from organic contamination especially commends it, although, if taken in considerable amount, it might occasion laxative effects from the considerable proportion of salines present. For washing purposes it cannot be well adapted on account of its hardness, but it can be satisfactorily employed for most culinary uses, although a soft water, even here, is often advantageous.”

Ancient Fortification in Louisa Co. Iowa.

BY REV. J. GASS.

[This paper was presented at the December meeting, 1880. —see page 147.]

In Grandview Township, Louisa County, Iowa, on Mr. Henry Gast's land, S. E. $\frac{1}{4}$ Section 14, on the bluff, which faces eastward and overlooks the Mississippi valley, a quarter of a mile back from the edge of the bluff, are the remains of two earth-walls extending across from one ravine to another, a distance of something over twenty rods.



The walls run in an east and west direction; the south one is 24 rods in length, the north one 21 rods. They are parallel, and enclose between them an area of two acres. The south wall is now six feet

high, and close to it on the north side, is a ditch five feet in depth and twenty feet wide. (See diagram.)

The northerly wall is five feet high, and immediately north of it is also a ditch, five feet wide and twelve feet across. Both walls and ditches are of course very much worn down by the action of the elements during the lapse of many years.

The two ravines on the east and west sides of this spot are convergent and both unite with a still larger one which runs eastward nearly parallel with the walls above described, at a distance of 35 rods from the southerly wall.

The ravines are 100 feet or more in depth and very steep. These ravines and the south wall thus enclose a sub-rectangular area of about five acres.

On the steep slope of the ravine on the west and near the top, three rods south of the south wall, is a circular excavation, nearly 100 feet in diameter, and now fifteen to twenty feet deep, made partly by excavating and partly by building up a wall around the west or downhill side. At the lower side is an opening or passage-way through this wall, which was formerly very narrow, but now somewhat worn away.

This passage way may be of later date, but no one knows, and it is impossible now to ascertain the fact. Directly west of this, at the bottom of the ravine, are two flowing springs, (OO) some three or four rods apart. The water of the northerly one is very cold and pure; the southerly one is a sulphur spring.

Over this whole area are scattered the stumps of large trees, several of which are directly upon the walls and in the ditches; showing that many centuries have elapsed since the construction of the work, and probably since its final abandonment.

As a work of defence, it is pretty well adapted for resisting assault, the hills on three sides being very steep, and the two earth-walls—which probably were formerly much higher than now—each having, *outside* of it, a once very deep ditch. The spring water close at hand would also be an indispensable requisite to sustaining a siege. It would seem, however, to afford not much protection, except by its distance, against missiles from the bluffs on three sides.

It has been conjectured—but never determined by exploration—that, possibly, the circular depression may be the remains of a well or passage-way down to the level of the springs, to reach the water without exposure to the attacks of an enemy.

DECEMBER 13TH, 1881—1 P. M.

A SPECIAL MEETING of the Academy was held, immediately preceding the funeral of its late President, Joseph Duncan Putnam, whose untimely decease took place on the 10th inst.

In the absence of the Vice-President, who, together with many of the active members of the Academy, was in attendance at the funeral rites then being held at Woodlawn, the home of the deceased, Dr. M. B. Cochran called the meeting to order, and, with a few brief and appropriate remarks, called Hon. Roderick Rose to the chair.

Mr. Rose alluded, in a short, impressive speech, to the great loss sustained by the community, and especially by the Academy, in this sad event.

The following members were appointed as a committee on resolutions to be presented at a meeting to be held on Friday evening, the 16th inst, to which time this meeting was adjourned: Prof. W. H. Barris, Dr. R. J. Farquharson, W. H. Pratt, Wm. Riepe, Dr. C. H. Preston and E. P. Lynch.

The members then attended the funeral at the Presbyterian church in a body, wearing crape.

DECEMBER 16TH, 1881.—ADJOURNED MEETING.

Dr. Preston in the chair. Dr. C. H. Preston, E. P. Lynch, and H. C. Fulton were appointed a Committee of Arrangements for a Memorial Meeting to be held on the evening of Friday, January 3d, 1882, and the presentation of resolutions and other exercises were deferred to that time.

Dr. R. J. Farquharson, a former intimate and valued friend of the deceased, having come from Des Moines to attend the funeral services, was present at this meeting, and in a few heartfelt words, paid a touching tribute to the memory of his young friend.

Remarks were also made by others present, expressive of the sorrow and sense of loss felt by the Association.

DECEMBER 30TH, 1881. — REGULAR MEETING.

Dr. C. H. Preston, Vice-President, in the chair. Ten members present.

Mr. Channing Hall was elected a regular member, and, in accordance with the action of the trustees at their last meeting, enrolled on the list of life members.

Mr. Pratt presented some notes regarding an artesian well recently commenced at the glucose factory in this city.

A committee was appointed, consisting of Prof. W. H. Barris, Mr. C. E. Harrison and Mr. Wm. Riepe, to present nominations for the several offices to be filled at the annual election, occurring on January 4th, 1882.

The following paper was presented:

Mound Explorations in 1881.

BY REV. J. GASS.

MOUNDS IN ROCK ISLAND COUNTY, ILLINOIS.

In section 11, Buffalo Prairie Township, Rock Island County, Ill., on a prominent point on the bluffs of the Mississippi valley, looking southward, is situated a large circular mound composed almost entirely of sand, and from which the surrounding population have for many years taken sand for building purposes. In the removal of the sand, human skeletons and other relics have occasionally been met with. Some of the relics thus found, including two curved-base, carved stone pipes, have been obtained for the Academy, and are now in our museum.

In May of this year I explored this sand-hill, and became convinced that it was indeed the work of the mound-builders.

The center of the mound had been entirely dug away, and it was probably about in the middle that the skeletons and relics were found, twelve feet below the surface. In my own search there I found nothing except a good many human bones and one flint knife. This mound has also been used by the Indians of the last centuries as a burial-ground, as is shown by the many bones near the surface.

In the same section, about a quarter of a mile east of the mound above described, I found a group of eleven mounds disposed in a nearly straight line east and west. They are situated on a ridge of land between the edge of the bluff and a ravine, and sloping toward

the east. The first or most westerly mound, on the highest ground, was circular and six feet high. An excavation was made from the top, about six feet by eight. Two feet below the surface were found two Indian skeletons, very poorly preserved. Four and a half feet down we came to a bed of human bones, occupying a space of some four feet in width and three in depth, so much decayed and in such confusion that it was impossible to determine the original position of the skeletons.

Near the skull of the lowest skeleton, on the northern edge of this bed of bones, was found a pipe, and two feet west of the pipe, a discoidal stone and some fragments of pottery and flints. East of this layer of bones, entirely separate, were two other skeletons, perhaps buried later.

The sixth mound, counting from the west end, was next examined. It was conical in form and five feet high, and on it stands an oak tree, two and a half feet in diameter. We made an excavation three feet in diameter; and at two and one-half feet from the surface, found a discoidal stone, a piece of red ochre, and a piece of galena, laid down in the form of a triangle. Another opening was made in this mound to the depth of five feet, where was found one skeleton.

In July we again visited this group. In the second mound, next to No. 1, and of the same size and form, an opening, six by twelve feet, was made; and six and one-half feet from the surface were found five skeletons lying east and west and close together, side by side. The one on the south side was farthest eastward; the next one about a head-length farther westward; and the third one as much farther still; and so on through the whole number.

Near the arm of the one on the north side was a carved stone pipe, and three feet from the skull another pipe. Two feet farther west were found fragments of two different earthen pots, two discoidal stones, and some pieces of flint.

The next mound opened was the third in the row, and considerably smaller than Nos. 1 and 2. The whole surface to the depth of two feet, was a red-burned earth mixed with ashes and coals. Four feet down were found a piece of galena, a few human leg bones, some bits of pottery, a marine shell and some other shells, and three circular pieces of human skull—"rondelles"—about one inch in diameter.

The fourth mound is a little larger than No. 3. Making an excavation of four by six feet, and four and one-half deep, we found

two skeletons lying close together, the head of one being to the eastward and that of the other to the westward. Near the hand and arm bones of the northerly skeleton was a pipe, and one and one-half feet east of both a discoidal stone and a few pieces of flint and pottery. Of the latter the fragments are certainly pieces of the same pot of which pieces were also found in mound No. 2.

Mound No. 10 of this row is about five feet high. Four and one-half feet down we found three skeletons with the heads to the west, and beneath these were scattered a number of the larger bones of the human body. No other relics were found.

The eleventh mound is smallest of all, about two and one-half feet high. Three feet down was one skeleton. No other relics.

The skulls in these mounds were found with the face upward in some instances, and in other cases downward. The bones in general were tolerably well preserved. The earth of which the mounds were formed was taken from the immediate vicinity. The skeletons were usually rather toward the easterly side of the mound.

About half a mile west of the above is another group of nine mounds, from three to seven feet in height. The fourth mound, numbering from the west, was opened by an excavation six feet square and five feet deep. A great many human bones were found in much disorder, and must have been the remains of many skeletons. No other relics.

In the ninth of this group, which was four feet high, I found, four feet deep, the remains of two skeletons with heads westward. The earth was mixed with ashes and coals. No other relics found.

Mound No. 6 was of the same size as No. 9; and four feet deep were found a few human arm and leg bones, and nothing more.

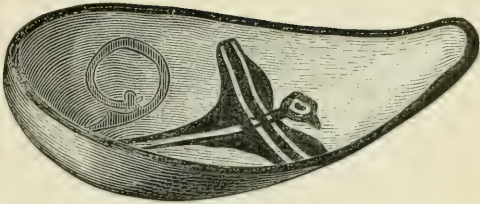
Mound No. 3 was about three feet high; and from the surface down to the undisturbed earth at the bottom was nothing to be found but a mixture of burned clay, ashes and coals.

Mound No. 1, a short distance eastward from the rest of this group, was the smallest of them all, composed of sand and ashes, mixed with a great many pieces of broken pottery. A number of little burned limestones were lying three feet down, on the undisturbed earth below the ashes. This mound was certainly a fire-place.

Mound No. 5, on a prominent point commanding a grand view of the valley, is the largest of the group. Here we made an excavation of eight by ten feet, down to the natural soil, where we found, about in the center, a grave, five and one-half by three feet, and one



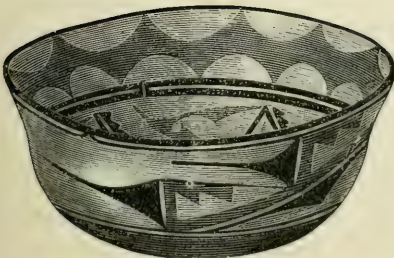
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and one-half feet deep, filled with red ochre mixed with pieces of white clay, instead of skeletons. About half a bushel of the paint was in this grave. No other relics and no bones were discovered.

[In the latter part of July last, a party from the Academy, consisting of Messrs. W. P. Hall, C. E. Harrison, George R. Putnam, W. H. Pratt and John Graham, visited the same locality and made some additional explorations, but found very few relics.

They opened the fifth, eighth, and ninth mounds of the group of eleven above described, and a few others in that vicinity.

In the fifth was found some broken pottery, of a light color, and very plain.

In the ninth was a pretty well preserved skull, and a quantity of other bones, among which was a lower jaw from which all the teeth had been long lost during life, and the jaw was reduced to remarkably small dimensions in depth and thickness. Some fragments of horn, and a piece of galena were also found here.

In the eighth nothing was found, and the other mounds opened at the same time also failed to afford anything of value or interest, beyond a few fragments of human bones.]

Mounds in Louisa Co., Iowa.

In June last I explored a number of mounds in Grandview Township, in the same region where, a year ago, my labors had been quite successful; but this time without results.

In Section 11, on Mr. Wagner's farm, is a group of thirty-six mounds. A number of these have been examined heretofore. I opened seven of the largest; two of them were six feet high, the other five only about three feet. In the first one I found, six feet below the surface, a bed of ashes containing a few fragments of pottery and two implements of trap rock.

The other large mound, the largest of the group, had been formerly hastily explored. I enlarged the excavation at the top of the mound and worked down to the natural earth without finding anything; but, widening the opening on all sides, I found on the east side, six feet down, a large limestone with a few pieces of pottery lying on the top of it, together with an arrow-head and a clay figure of the human head, about an inch in diameter and burned. This is in our Museum.

Opposite this, in the west side, I found another limestone of about

the same size, with a small stone axe and a discoidal stone lying on it. No other relics were discovered.

In the other five, smaller mounds, which we opened, I found not even a trace of human bones; nor had other parties who examined them before, found any so far as I could learn.

In general, I believe, these mounds were not used for burial purposes; and, judging from the few relics found here, possibly these mounds may be the work of a different tribe of mound-builders.

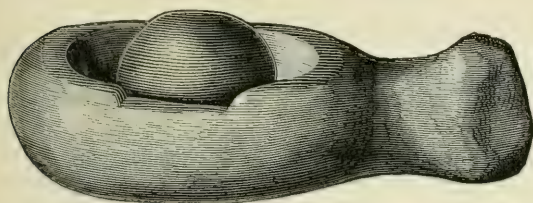
In Section 13, two other mounds, four feet high, were explored. In the first was a bed of ashes containing pieces of pottery and flint. The second contained fragments of pottery similar in color and material to that from the lower Mississippi Valley. No bones were found.

In Section 24, on Mr. Godfrey's farm, we also explored two mounds, each about four feet high. Four feet from the top of the first was a skeleton, lying in the usual horizontal position, with the head westward; also a small flint knife. In the second, about twenty-four paces southward, was made an excavation of four by five feet. Two feet from the surface was a bed of ashes one foot thick; and above this the clay was burned. In this bed of ashes were imbedded several small white stones representing a rude and incomplete form of a mound-builder's pipe, intended for some animal form; but they slacked up so on exposure to the atmosphere, after being washed, that it was impossible to preserve them. They were probably of limestone and burned. No other relics were found.

Here I learned that a Mr. Potter, who resides five miles from Toolesboro, was in possession of a stone tablet, taken from a mound; and, hiring a horse and buggy, I visited him, and he showed me the stone and told me that he found it in a mound at Toolesboro, thirteen feet below the surface, resting on a small pile of human bones.

It is a slab of white sandstone, two feet long, three feet wide, and three inches thick, rounded at the corners. On one side I found a few signs or pictures which certainly are very old, and perhaps made by the mound-builders themselves; but these original signs, perhaps, did not satisfy the discoverers, so they added some English letters, completely destroying the value of this specimen. The gentleman kindly offered me the stone for our Museum, but I did not wish to accept a relic which had been thus tampered with.

On this occasion I had the pleasure of inspecting some very important relics in possession of the people there, which, however, it was impossible to obtain for the Academy.



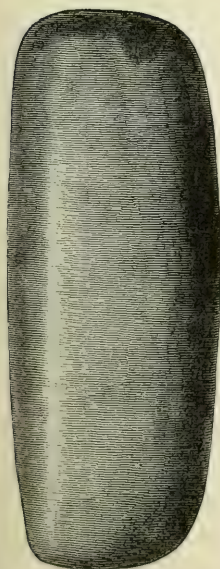
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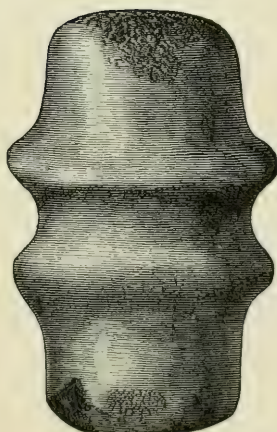
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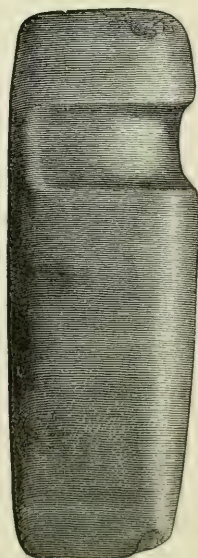
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Mounds near Muscatine.

On the bluffs on the west side of the Mississippi Valley below Muscatine, are many groups of ancient mounds. On Mr. Schmale's farm, are five mounds from five to eight feet in height and sixty-five feet, more or less, in diameter.

In the first mound, at the west side of the group, which was five feet high, an opening five by six feet was made from the top and five feet deep. Here I found the remains of two skeletons, the head of one being eastward, and the other westward. The bones were much decayed, and crumbled on being removed. Here and there in the soil were some pieces of charcoal and pottery, but no other relics.

In the next mound, No. 2, only one skeleton was found, and no other relics.

The third mound is eight feet high. Making an opening of eight by twelve feet, I found at the depth of seven feet a pit, two by three feet and one foot deep, containing a number of human leg and arm bones and pieces of skulls, but nothing more.

Mound No. 4 is six feet high. Six feet down I found three skeletons covered over with pieces of wood. At the sides I found pieces of pottery and marine shells; but the whole were so decayed and fragile that nothing could be secured for the Museum.

The fifth mound was the smallest, and nothing was found in it except a few bones.

These five were all composed of a very hard clay, making the work of exploration very laborious.

One mile west of the last mentioned group, on Mr. Hershey's farm is a group of forty-six mounds, arranged in four concentric semi-circles. These are all of a conical form, except two of the largest, of which one is oval, and the other long and narrow. The heights of all vary between two and six feet. I explored twelve of these mounds, and learned that some are burial mounds and the rest are not. The bones contained in the former are much decayed, and in the most of them the remains of only one skeleton, and in no case more than two.

Ashes and charcoal were found in every mound, but no relics of importance, except a few arrow heads and fragments of pottery.

Down at the river, directly even with this group of mounds, is an old camping-place, where, for an extent of fifty yards along the shore the high water washes down a great number of pieces of pottery, flint

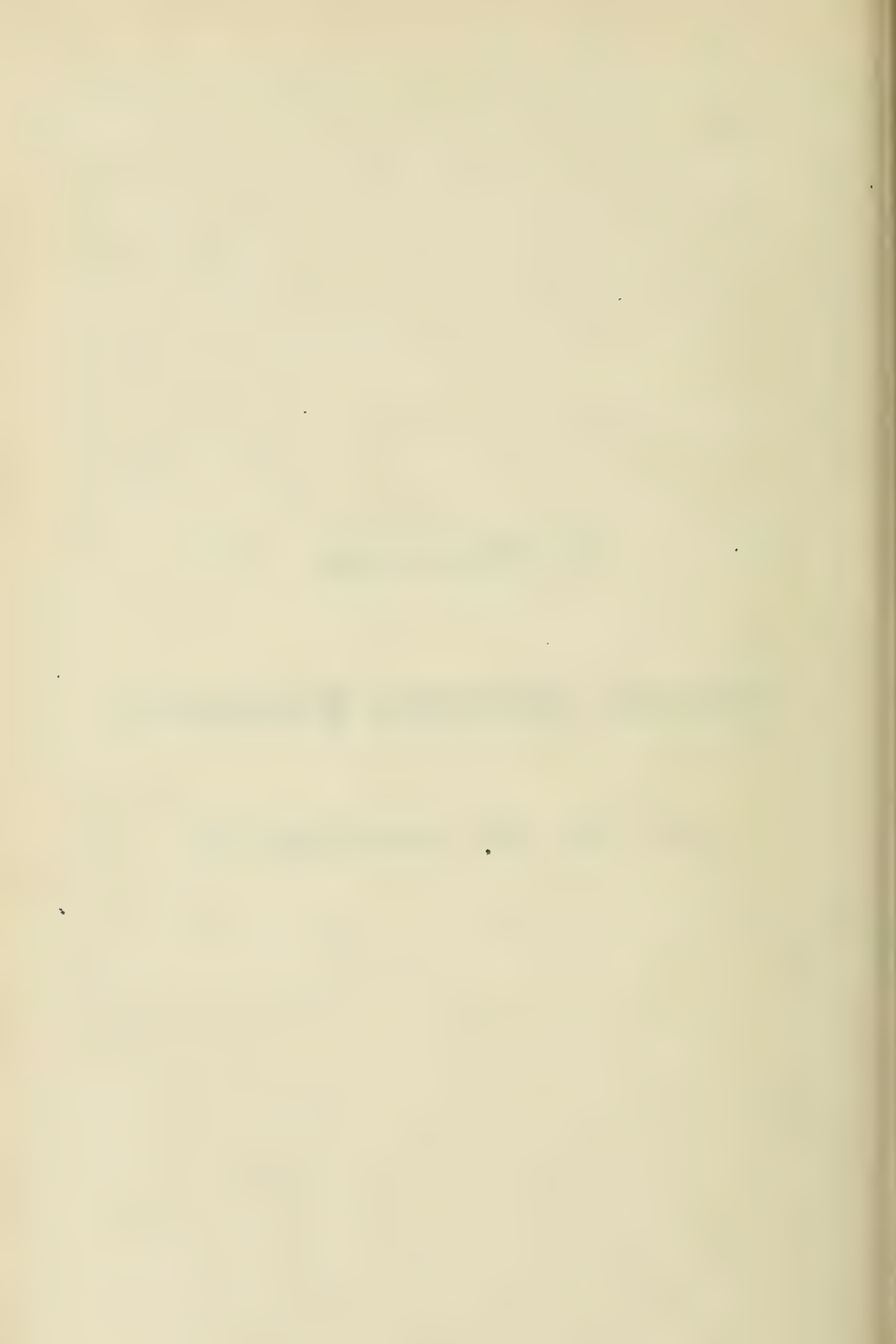
implements, animal bones, and perhaps also human bones, which are imbedded two or two and a half feet below the surface, between the black soil above and the sand below. These pieces of pottery, and also those from the last described mounds, exhibit a greater resemblance to that from the lower Mississippi valley, collected by Capt. Hall, than to that which we usually find in the mounds here, and, on the whole, I am inclined to the opinion that these mounds are less ancient than the most of those in this section of country. A closer investigation in the future, may, perhaps, furnish more satisfactory evidence in respect to this supposition.

In comparison with the results of last year's explorations, we have been this season much less successful in the collection of relics, partly on account of our diminished financial resources, and partly and chiefly because we had less opportunity for working in the more important mounds; perhaps, also, we were less fortunate in our selections in the several groups. We hope, however, to continue these researches, and, next year, with increased success.

In Memoriam.

Joseph Duncan Putnam.

Natus 18 Oct., 1855 ; Obiit 10 Dec., 1881.



INTRODUCTION.

The Third and concluding Part of Volume III of the PROCEEDINGS of the Davenport Academy of Natural Sciences, is now given to the public. In accordance with previous announcement, "it is exclusively devoted, as a fitting tribute to the memory of the late President of the Association, JOSEPH DUNCAN PUTNAM, to whose earnest zeal and untiring labors all its previous publications are mainly due." This memorial number embraces the proceedings of the Academy upon the decease of Mr. Putnam, and his unpublished scientific notes on the North American *Solpugidae*.

The biographical sketch of Mr. Putnam by his life-long friend, Dr. C. C. Parry, was especially prepared by request of the memorial committee appointed by the Academy, and was presented at a meeting called for that purpose on Friday, September 22d, 1882.

It should also be stated that Dr. C. H. Preston, Acting President, in his address at the annual meeting, January 4th, 1882, made appropriate and kindly mention of the life and labors of his predecessor. This paper will appear in Volume IV of the Proceedings of the Academy.

The excellent steel engraving of Mr. Putnam, which appears as the frontispiece to this part, is the work of the eminent engraver, Mr. G. H. Hall, of Brooklyn, New York.

It is deemed appropriate to include, in this memorial number, resolutions adopted by other scientific societies upon the occasion of Mr. Putnam's death, letters of condolence received from eminent scientists abroad, and a thoughtful and carefully prepared address delivered before the Iowa Academy of Sciences, at Iowa City, by Prof. W. J. McGee, of Farley, Iowa.

The obsequies of Joseph Duncan Putnam, took place December 13th, 1881, at 2 o'clock P. M., from the First Presbyterian church, Davenport, Iowa. The pall bearers were selected from among his working associates in the Academy, viz: Dr. R. J. Farquharson, Prof. W. H. Pratt, Prof. William Riepe, Dr. Charles H. Preston, Dr. E. H. Hazen, Charles E. Harrison, H. C. Fulton, and E. P. Lynch. After private devotional exercises at Woodlawn, the family residence, the casket containing the remains of the deceased, was borne to the church, which was crowded with sympathizing friends. As the cortege approached the church, Trinity chimes pealed forth in muffled tones, the dead march from Saul.

The Rev. Dr. Barris, who had been intimately associated with Mr. Putnam in scientific work, was expected to be present and make the principal address. He was, however, detained at home by illness, and in his absence Rev. Dr. Clute, Pastor of the church, made some appropriate impromptu remarks. He gave an interesting account of his interviews and conversations with the deceased. He thought him peculiar in many of his characteristics, and in determination and acquirements a truly great man. He likened him to an island peak in the midst of the sea, which stands alone amid the waste of waters, visible from afar. So it seemed to him that the deceased stood in this community, silently accomplishing his purposes in study, and as he worked alone, enjoying his communion with Nature and God, he attracted everywhere the notice of men eminent in science.

Though he had just entered on his twenty-seventh year, when death called him, still he had lived a long life in view of his profound studies, his large acquirements, and his world-wide reputation. His investigations into the science of entomology were so remarkable as to attract the notice and commendation of eminent scientists in other lands. He was one who made the weakness of his physical nature succumb to the powers of mind and a strong will. As a mother loveth her children—as his own devoted, stricken mother loved and watched this, her son—even so he loved his favorite pursuit, and bent all his soul to it. He studied in his investigations all the manifestations of the wisdom and power of God, and delighted in the evidences, thus made known to him.

The Rev. Dr. Stiffler, of the Baptist church, followed in an effective and appropriate address. He said he had come to pay his last tribute to a friend. The giving up of such a life as that of Duncan Putnam was a loss to our community and the world. In the study of insect life were to be found some of the sweetest lessons of Divine wisdom. Death did not end all. It might carry away all of this life, but fame, influence and fruit of labor survived. Duncan Putnam was dead, but many a student would find the light of that life shed upon him.

The choir composed of Miss Alice Hartzell and M. C. Smith, with Mrs. Robert Smith presiding at the organ, sang very effectively, "Asleep in Jesus." The casket was then borne to the hearse, followed by sorrowing friends, and as the long procession moved off for the last resting place of the deceased, at Oakdale, Trinity chimes again sounded, in muffled tones, a requiem for the dead.

EDITOR.

PROCEEDINGS
OF THE
DAVENPORT ACADEMY
OF
NATURAL SCIENCES.

VOL. III.—PART III.

MEMORIAL MEETING

IN HONOR OF JOSEPH DUNCAN PUTNAM, LATE PRESIDENT OF THE
ACADEMY, HELD JANUARY 6TH, 1882.

The Academy met pursuant to adjournment, President Dr. C. H. Preston in the chair.

At the hour appointed, the audience room was filled with members and sympathising friends. A life-like portrait of the deceased hung above his vacant chair, which stood, appropriately draped, in its accustomed place; while upon the Secretary's table was a plaster-cast of the well known, thoughtful face, taken soon after the informing soul had left its tenement of clay.

The exercises of the evening were prefaced by the anthem, "Cast thy burdens on the Lord," which was touchingly rendered by a volunteer quartette, consisting of Mrs. P. E. Brockett, Miss Mary Gillette and Messrs. E. M. Edgerton and H. J. Lafferty; the Rev. N. M. Clute, of the First Presbyterian Church, following in prayer.

The President, after stating briefly the object of the meeting, in behalf of the committee, presented the following resolutions, which were unanimously adopted:

WHEREAS, In the Providence of God, the hand of death, which none may evade, has removed from this stage of existence in the morning of his life and usefulness, our talented associate and honored President; be it

Resolved, By the Davenport Academy of Sciences, that in the demise of J. Duncan Putnam, we recognize an irreparable loss, not only to the cause of natural science to whose advancement he was so earnestly devoted, but to each and all of his associates who have felt, and in some measure profited by the ennobling influence of a life so active and unassuming, given to other than selfish aims; of one whose riches were understanding, and whose best loved treasures, truths.

Resolved, That the Academy, as an association, feels its deep obligation to the tireless organizing and sustaining efforts of the deceased, and to his valuable scientific labors in his chosen field of Entomology, labors which were those not of a collector merely, but of an original observer, a careful student of embryology, and of the methods of insect life.

Resolved, That in conformity with what we believe would have been his desire, we will strive to make the Academy deservedly honored at home and abroad, and to this end will labor to sustain the publication of its proceedings, a work to which, realizing its importance, he gave the best powers of his waning life. By so doing we shall erect to his memory a monument more acceptable, as it will be more useful and enduring than granite or marble shaft.

Resolved, That a copy of these resolutions be transmitted with our sympathy to his sorrowing parents and friends, and that copies be furnished to the *Daily Gazette* and *Democrat*.

Prof. W. H. PRATT then read an address, which was a heartfelt eulogy of the deceased, who had been to him at once pupil and instructor, throughout their long familiar intercourse as friends.

Address of Prof. W. H. Pratt.

Our late honored and beloved President, associate and friend, JOSEPH DUNCAN PUTNAM, in memory of whom we meet here tonight, was born at Jacksonville, Illinois, October 18th, 1855. His parents were Charles E. Putnam and Mary Louisa, daughter of Governor Joseph Duncan, of Illinois, and he was the eldest of a family of eleven children, seven of whom survive him. He was a descendant in direct line from John Putnam, who came from Buckingham, England, to Salem, Massachusetts, in 1634, and who was the ancestor of the Putnam family in this country, so far as known. Thomas Putnam, through whom he traces his descent, was the grandfather of Gen. Israel Putnam of Revolutionary fame.

Edward Holyoke, of Tamworth, England, who was at Lynn, Mass., in 1636, and who was the grandfather of Rev. Edward Holyoke, for thirty-two years President of Harvard College; Benjamin Risley, of Hartford, Conn.; Rev. John Stockton, of Kingholt, England; and the Olcott, Gibbs and Fuller families of early New England history, are found in the line of his ancestry. Through his grandmother on his father's side, he was a descendant of Daniel Morgan, of Colchester, Conn., who was the ancestor of the famous general of that name. His grandfather on his mother's side was the late Governor Joseph Duncan of Illinois, whose ancestors came from Scotland and settled in Virginia about the middle of the last century. Through his grandmother on this side, he was a direct descendant of John Caldwell, who came to this country about 1730, and settled in Virginia, and who was the father of the noted Rev. James Caldwell of Elizabethtown, New Jersey, and the great-grandfather of John Caldwell Calhoun, the famous South Carolina senator. James R. Smith, a wealthy shipping merchant of New York, was his great-grandfather, and John Ogden, the founder of Elizabethtown, also belongs to this branch of his ancestry.

Duncan was born at the old Duncan homestead at Jacksonville, but all his childish memories were of Davenport as his home. At the age of eight years his school education began, at the German-American Institute, conducted by Mr. Wm. Riepe, who is now here with us, and under his instruction he began the study of the German language, and received his first regular lessons in drawing. Later, he attended the public schools of this city up to the age of nearly seventeen, and was in one of the intermediate grades of the High School when his connection with them terminated. During all these years he was a hard student, and, his physical constitution not being very strong, it was often necessary to take him from school for a few months for rest and recuperation. He always ranked among the first in the classes with which he was connected, especially in mathematics, and acquired some knowledge of the French, Latin, and Greek languages.

At the age of eleven, in 1866, as his diary shows, he began making a collection of insects, for which he seems naturally to have had an especial taste; and in 1869, when in his fourteenth year, he had already commenced their scientific classification.

At the same time he was also making collections of autographs, stamps, coins, minerals and geological specimens, but more especially in objects of natural history. When out of school, much of his

time was spent in the excellent home library, and his after life has shown that here he had stored up a vast amount of knowledge, which was always available, for he seemed never to forget anything he had once learned.

Impressed, at a very early age, with the importance and value of the printing press as a means of culture and progress, Duncan and his younger brothers determined, with the wise encouragement of their parents, to procure a press with money saved from their little gifts and earnings. It is worthy of note, as an indication of his turn of mind at that tender age, that, when he became interested in that matter, he thoroughly searched his father's library and all other sources within his reach, and made an exhaustive study of the printing press, thoroughly informing himself of the history of the invention and every improvement, and the peculiar excellences and defects of each, before leaving the subject.

The press was purchased, with sufficient type for the publication of "THE STAR OF WOODLAWN, a *Quarterly Magazine Devoted to the Development of Amateur and Domestic Literature*," in which the family and friends joined by contributed articles, and which was continued for several years; and here was his first experience in writing for the press, setting type, reading proof, engraving, printing and binding, which helped to prepare him for the work of later years.

During the years 1868 to 1870 he collected insects, shells, and geological specimens, in long and frequent rambles with one or two older friends of similar tastes, but gradually concentrating his attention upon entomology.

In 1871, while on a visit at Saratoga, he occupied himself in the same pursuits. In 1872 he spent three months up in the mountains of Colorado, with Dr. C. C. Parry, where he added largely to his collection of insects, as well as to his knowledge of the subject. It was on this trip that he first met with the eminent botanists, Dr. John Torrey, since deceased, and Prof. Asa Gray, between whom and himself an intimate friendship has since been maintained.

His health and strength seemed to be considerably improved by this summer excursion, and the succeeding winter was spent in hard study at home.

In 1873, after a few days instruction in the methods of meteorological observation and forms of reports at the Signal Service office here, he spent five months with Capt. Jones' expedition to the Yellowstone, as meteorologist in the United States service. His travels on this expedition, over more than a thousand miles of the rough

districts of Wyoming and the National Park, riding a mule, or sometimes on foot, carrying his instruments, measuring elevations, keeping a constant meteorological record and making out the reports, involved a great amount of very arduous labor and exposure; but, like everything else he did, it was done thoroughly and well, and received honorable mention in Capt. Jones' official report.

Here again he found time and a good opportunity to continue his favorite pursuit in gathering insects, and discovered some species new to science.

On returning, he commenced his studies to prepare for entering Harvard College the next year; reciting twice a week to Professor Young in Latin and Greek; but this he was compelled to give up entirely and forever on account of failing health.

After taking a severe cold, he had, on the 30th of December, the first attack of those hemorrhages from the lungs, which continued at intervals to the time of his death, eight years. Their frequent recurrence became alarming, and required constant care, yet during this trying winter, with his usual cheerful and courageous spirit, he employed himself in arranging his large Colorado and Yellowstone collections.

When the weary winter months brightened into spring his father accompanied him to Colorado. After visiting Manitou Springs and other places, it was decided to leave him with friends and a younger brother, at Valmont. Here he spent four months, and then with renewed strength went to Empire City, where he met his mother and Dr. and Mrs. Parry. Six weeks were spent camping in a deserted cabin, enjoying the society of Dr. and Mrs. Engelmann, Mr. and Mrs. Ballord and others, when he removed to Canon City and there spent the winter of 1874-5, in collecting fossils for the Academy, and insects for his own collection.

In April he returned home for a six weeks visit, after which he accompanied Dr. Parry to Utah, where the summer was passed at Spring Lake. In the fall he proceeded with Dr. Parry to California, where he was visited in December by his father, with whom he returned home in very feeble health.

In all the different regions he had thus explored, he had gathered over 25,000 specimens of insects, embracing an immense collection of different known species, some of which were very rare, besides a considerable number of new species, several of which have been named in his honor, in recognition of his scientific attainments in

entomology. During this time he had become especially interested in the *Arachnida*, and made large collections of specimens, and of books on that subject.

While at Salt Lake City, he spent some time at the museum there, and arranged for it a collection of the insects of Utah, collected by himself, identified and labeled ready for exhibition.

On the 22d of June, 1872, he discovered in Colorado, his first specimen of the *Galrodes*, a group intermediate between the spiders and the scorpions, which finally became his special study, and to which he would have devoted many of the coming years. He wrote the next day to Prof. Hagen of Cambridge, and received from him a very elaborate letter in reply, recognizing the importance of the discovery, and of the study of that family—*Solpugidae*—of which very little was yet known, and of which specimens were very rare, and he was evidently impressed with Duncan's ability and aptness for such a study.

In the next season he obtained one more specimen, and since that time, chiefly by exchanges, he has made a considerable collection from Mexico and elsewhere. He was, up to the time of his death, the only person in this country who had made much progress in the study of the family of *Solpugidae*.

From the date of the organization of our Academy, though but a school-boy of twelve years, Duncan manifested much interest in its progress, and on the 22d of June, 1869, he was elected to membership, and at once became an active and useful member.

On the 28th of April, 1871, in his sixteenth year, he became recording secretary, in which office he was remarkably efficient, and retained the position until compelled to resign it on account of ill health, in January, 1875.

On November 23d, 1876, he was elected corresponding secretary, which important office he filled until he became our President in January, 1881. From that date to the day of his death, nearly one year, he was President and acting corresponding secretary. In this position, from the very extensive correspondence he established with scientific men and societies of many countries, and the judicious manner in which he conducted it, he not only himself became widely and favorably known both in America and abroad, but contributed very largely to the success and progress of the Academy, and especially to that of its library.

On the 26th of November, 1875, immediately after his return from California, he presented at the Academy meeting, a set of resolutions

setting forth the importance of the publication of the proceedings of the Academy, and determining upon its commencement "with the least possible delay." Such a step no one else among us had had the nerve, the confidence and resolute determination to take, but the resolutions were adopted, and the result has abundantly proven, not only the entire practicability but the wisdom of the undertaking; a work which but for him would perhaps never have been commenced.

In accordance with the resolutions, a publication committee was appointed of which he was chairman, and from this time to the very day of his death he pushed forward that work, editing and arranging the matter, selecting the material, superintending the printing, often advancing the means to pay for it, and latterly furnishing the type by the use of which the cost was reduced to one-half; and one of the very last remarks he made, an hour or two before his breath ceased, was one to me, regarding the printing of the last sheet which had been prepared for the press. He labored not for the present only, but for the future, not for what he could do while with us, but to place the work on a permanent and self-sustaining basis, and if we who remain are at all faithful to our duty, if we follow his example of unselfish effort, he will not have failed in what he hoped to accomplish; it can be sustained, the most arduous portion of the task has already been performed by his self-sacrificing devotion. The work has reached very nearly the middle of the third volume, has been circulated far and wide, has received the approval and commendation of scientific men everywhere, and has brought rich returns in building up a valuable library.

In 1872, his attention was directed to the "maple bark louse," which had suddenly become very destructive to the trees in this and other localities, and on June 14th, he presented, in an Academy meeting, a brief but instructive paper on the subject. With all the other work in which he was engaged, this subject was never lost sight of, and he spent the summer of 1879 in most assiduous and thorough microscopic work in an original and exhaustive investigation of the embryology and development of this insect; the kind of work which not only throws light upon profound problems in biological science, but places in man's hands the power to curb the ravages of noxious insects, and save his trees and crops. The results of this research were embodied in a paper of over fifty pages of our Proceedings, the most elaborate and complete paper he has ever published, under the title of "*Biological and other Notes on Coccidae.*" This paper at once established his position among the ento-

mologists of our land as one of the most able and promising workers in their ranks, where his name will ever stand.

During several years he has occasionally found in the books received, entomological articles printed in various languages with which he was unacquainted, the Russian being one of them; and in such cases he would study up the language with such aids as he could command, and thus always managed to arrive at the gist of the matter presented.

In 1880, in company with Dr. Farquharson, he attended the Boston meeting of the American Association for the Advancement of Science, of which he then first became a member, and, at the same session, he was elected a Fellow of the Association, an honor conferred only in acknowledgment of eminent scientific attainments, and very seldom upon young members.

After this meeting he spent some months in exploring the principal libraries of eastern institutions, of which he has the following memorandum among his papers.

"NOTE OF A BIBLIOGRAPHY OF THE GALEODIDÆ."

"Having devoted my leisure moments for some time to a study of the *Galeodidae*, I availed myself of the opportunity in the fall of 1880 to investigate the present condition of the literature of this very interesting and seemingly much neglected group of animals. In doing this, I visited all the principal scientific libraries in Cambridge, Boston, New York, Philadelphia, Baltimore, Washington, Chicago and Davenport. I found that this literature was much more voluminous than I had supposed, and I soon had a list of over two hundred and twenty works (including different editions of the same work) to be consulted, without taking into account the numerous references in the works of classic Greek and Roman authors supposed by Lichtenstein and others to refer to *Galeodes* or *Solpuga*. Of these two hundred and twenty works all but about thirty-five were found in one or more of the libraries visited. Thirty of the works not seen were different editions or translations of the others; thus leaving but five works of importance not seen. A complete abstract of each work was made, thus furnishing material for a complete index and historical summary."

I may add that this historical summary he has since made, the abstracts being classified in order of time. Also, that they are illustrated by a great many drawings which he copied from the works consulted, and forming a basis and preparation for the study of the *Solpugidae*, which would be exceedingly valuable to any one who should undertake a thorough investigation and development of the subject, such as he intended and would surely have accomplished. How he found time and strength for so great a work, seems almost

incomprehensible. It must have been due, however, to the fact, that he always saw at once what was to be done, and the best way to do it, and as a consequence all his work was so systematized that no labor was lost. Every note, list, paragraph, or memorandum was complete as far as it went, when it left his hand; in perfect form and order for future reference, and always available.

He attended also the next meeting of the American Association which was held at Cincinnati last August, (1881), and was placed upon the committee on publication. At these meetings he met and became acquainted with a large number of the leading scientific men of the nation, and won the respect, esteem and confidence of all. Latterly, until his strength entirely failed, his time has been chiefly devoted to the publication of the Proceedings as before mentioned. A large portion of the illustrations have been the work of his own untaught—or self-taught—hands. His facility in mechanical manipulation was marvellous. He spent no time in experiment; the work he did was always for actual use. Of his first effort in etching on steel—and a very elaborate plate it was, where a failure in any part would spoil the whole—Mr. Bannister, the Secretary of the American Bank Note Engraving Company at New-York, on examining it, said, “wonderful, *wonderful*, WONDERFUL!”

The very building we now occupy was erected upon an original design, planned and drawn by him, and adopted with scarcely the slightest modification.

In manner, he was rather undemonstrative, never wept, and, though he had a pleasant smile for all, and a vein of dry humor which would sometimes crop out, he seldom laughed, at least in later years, beyond a pleasant or amused smile; he was on the whole a serious, and cheerful man.

In executive and administrative ability he was naturally strong, and would have become eminent. He possessed, I think, a remarkable combination of enthusiasm and conservatism. Earnest, persistent, indefatigable and enthusiastic in the pursuit of knowledge, he was fully imbued with the true scientific spirit, and never jumped to a hasty conclusion. A true naturalist, our brother was always happiest when enjoying the most intimate and free communion with nature, and when engaged in endeavoring to sound her profoundest depths, and to learn of the realities of things. He very fully appreciated the harmonies and beauties of nature, and found in her processes nothing to be suppressed or ignored in the pursuit of sci-

entific knowledge, being totally free from that false delicacy which could make such distinctions. He was decided, but never bigoted or dogmatic in his opinions, and was concise and rather epigrammatic, but often manifesting some diffidence, in the expression of them. While possessing good powers of generalization, and of tracing the causal relations of the various phenomena and conditions observed, he was not much given to theorizing; always open to conviction, he suspended judgment until the evidence seemed to him to warrant a conclusion, and when his opinion was fully formed, he invariably listened, patiently and cheerfully, to those who doubted or disputed where his own convictions were strong; indeed, he rather invited objections and criticisms. He was not fond of controversy, and while ever ready to explain his views, if requested, and to give information, he would not devote time and strength to the defense of mere opinions, or to bring others to his way of thinking. He favored all true reforms, but could never make a hobby of any.

In early childhood, as we have seen, his future character and possible career were plainly foreshadowed, indeed it would seem that his *character* was already formed. As fast as his strength and faculties were developed, their *direction* was found to be predetermined. He passed through no years of thoughtless, purposeless life, but was occupied throughout, as if he had been aware that the work of a life time must be accomplished within the short span of twenty-six years.

That life was a short one only as measured by our little calendar; estimated by his work and by his own development, and in the light of a broad view of universal progress, and of his part in it, it was a comparatively long one. Surely the true measure of *life* is not the swing of the pendulum, or the revolution of a wheel, or a planet, but the impress made on human destiny and human happiness, the steps taken in the march of human progress, the light cast upon the dark places of ignorance, the encouragement given to earnest effort, the moral lessons taught, the atoms added to the sum of human knowledge.

Our departed friend's religion was of the highest character, both too simple and too broad to be defined by, or contained in any formulated creed; it consisted—as I understood him—in no speculations upon Divine attributes or intentions, and no attempted interpretations of them, but in an absolute and steadfast faith in the wisdom and beneficence of the Supreme; a perfect loyalty to truth; a

reverence and love for everything that is right, and just, and pure, and good; a realization of "the fatherhood of God, and the brotherhood of man;" a deep human sympathy, and a broad charity for the failings of others. He was open as the day, candid and sincere as the little child, and as a friend the truest of the true.

In his most careless moments he never used an expression which would be out of place in any company, public or private, or unfit for the ear of the most fastidious, delicate and pure.

He kept himself posted in political matters, but took only a general interest in them, and none in party politics. He could never be a partizan in politics, or a sectarian in religion. Ambition for notoriety, jealousy regarding priority, and a disparagement of the views of others, unfortunately too common among scientific investigators, had no place in his character, and could never have been developed there. His life was a constant rebuke to vanity and selfish greed, narrowness, jealousy and cunning. His noble aim, that to which he devoted himself, was nothing less than the advancement of science (that is *true* knowledge) for the benefit of mankind; he labored to build up the Academy not as an end, but as a *means* to the great end, "the increase and diffusion of knowledge."

He was, in a greater degree I believe, than any one else I ever knew, the possessor of the "magic staff" of Andrew Jackson Davis, the power "under all circumstances to keep an even mind." When gratified he was never greatly elated, and when grieved or disappointed never unduly depressed. Not like the small vessel moving smoothly along with a favoring breeze, though easily tossed by every changing wind, and powerless in calm or storm, but rather like the majestic steamship, containing its power, its resources, its compass, and its helm *within itself*, moving calmly on its *chosen* course, and undisturbed by adverse gales and troubled waters which toss the lighter craft at their pleasure.

He was one of those who *make* circumstances; influencing, rather than influenced by his surroundings. But there was a fatal weakness in his physical constitution, an insidious disease had found lodgment there, one which no human foresight could avert, and no human power or skill could overcome. It was only a question of time when it would assert its supremacy; and he is gone—his work is done—but he still lives with us *in* his work. It abides, and will still abide, when we also shall have passed away and joined our comrade where "the weary are at rest." It remains, containing the

stamp of his thought and his character everywhere. In his very weakness he was strong.

Our cherished institution is a noble monument to him, bearing his image on every side, and the impress of his mind and hand in every grain and fibre of its constitution and growth.

It is a source of consolation to us to remember that, though at times subjected to much physical pain, he was able in a measure to rise above even that, almost to ignore it in his devotion to his studies, when others would have found no mitigation of its acuteness; and on the whole, his life was a happy one.

Situated in a beautiful and most happy home, supplied with all that taste, culture and refinement can afford; respected, esteemed, and loved by all who knew him; with ample opportunity for the search after knowledge, one of the largest and best selected private libraries in the land, at his command; with pecuniary means for indulging his taste in literature, procuring scientific books and the appliances for study of natural history; enabled to devote his time chiefly to his grand aim in life, "the increase of knowledge," and especially being able in the latter years, to be actively and successfully engaged in its "diffusion" by the Academy publications, and his contributions to other works; with all this, and no petty personal schemes or ambition to distract him, *he was a happy man.*

Surely we may indulge in high expectations for the future of our race, when such a type of manhood is presented for the encouragement of the philanthropist, and the maintenance of our faith in humanity, and the infinite wisdom of the All-father.

The highest eulogy which could be pronounced upon such a man would be, as every biography should be, the simple truth. Words are inadequate to the perfect description of character—*ordinary* humanity has not the power to describe its *highest* manifestations. If the most complete equanimity and self-control, unswerving singleness of purpose, disinterested devotion to principle, broad philanthropy, charity, magnanimity and self-abnegation, a full and symmetrical development of every side of character, refinement of feeling, purity of thought and expression, soundness of judgment, perfect patience under suffering and annoyance, and great executive, literary, and scientific ability; if these constitute greatness, then surely was our departed friend and intimate companion, though young in years—a GREAT *man*; and we may well say, "Take him for all in all, he was a man whose like we ne'er may look upon again."

After a song by the quartette; Mr. H. C. Fulton presented an address, as follows:

Address of H. C. Fulton.

When death takes those who are endeared to us, by their relationship, works or virtues, we erect a monument to their memory. So, but few die without leaving behind some loving heart and willing hands, ready to raise at least a humble stone in remembrance of them. This we all expect. But in the mighty army which yearly steps into the darkness of the tomb, how many have built their own monuments, and left behind enduring works, which will outlast shafts of granite, and keep their memory bright long after marble and stone have crumbled to dust? They are but few. It is only those whose inherent genius, and broad abilities carry them beyond the family hearth-stone, and give them a place in the respect, affection, admiration or love of a large circle of people.

Thus it has been with our lamented President, Joseph Duncan Putnam, the loss of whom we now so sincerely mourn. For not only do we and the people of his own country, and of his own tongue, lament, but over the earth where civilization has established a scientific society is his loss felt, and thousands are not only sympathizing with his bereaved family and with us, but join in the mourning.

The monument which will stand to his memory, and preserve his name, is the one erected by study, research, and labor in the fields of science. Our Academy is part of the fruit of that labor; for no one has done more for its establishment, or been more active in laying the foundation on which we can now so successfully build, if animated by the same spirit that actuated him.

How seldom is it that one so young, reaches the position he has attained in the world of science; and has been considered, and received as the peer of the acknowledged leaders, who have made a reputation by years of study and research extending beyond the entire length of his life.

What were the qualities of Joseph Duncan Putnam's nature which gave him eminence and raised him above his fellows? For years he was a sufferer physically; subject to ills which would have totally deterred most of us from close application and work; but not so with him, for he possessed a genius for scientific study and labor which nothing could deter—nothing but death itself; not even its threatening presence, which had been impending for years before its

actual coming. It was this determined spirit to carry out an end in view, coupled with a thoroughness of work that made him what he was. A trait made the more noticeable in a country where all is hurry, and the great aim is to reach an end regardless of the way, or the perfection of the work.

No difficulties discouraged him. An obstacle was never a barrier, only something to be surmounted. If unable to find a way of accomplishing a task, he made a way. If what he wanted to learn was hidden in a foreign language, he learned the language. If he needed unobtainable tools, he made them, and learned all about their manufacture before he did so. If he wished to print, he learned the art—not only in its practice, but its theory and history. If he needed a steel plate, he engraved it; a wood-cut or etching, he made it. And his work compared favorably with that of the best artists. Time consumed was nothing; and delays never exhausted his patience. If books were needed to which he had not present access, he made memoranda of what he wanted, and waited until large libraries could be visited; and never stopped until all known authority was consulted, and the subject exhausted. When he had mastered what others knew, he built on their knowledge by original thought and research.

To him nothing was small or insignificant. He looked at everything through a microscope, and saw its importance. He paid as much attention to details as to great results. Wherever he laid his hand this is seen. System and thoroughness in everything. None can appreciate this so well, as those who worked with him.

The amount of labor he has done is really astonishing; not only in his own special study of entomology, but in other departments, and especially in the routine work of the Academy; for there is no part, department, or work of the Academy, but that shows the labor of his hands and mind. He never seemed to tire, or become discouraged from press of work; but moved steadily onward and accomplished each self-imposed task in its order, and was ever ready to take up new burdens. The committee he was on always acted promptly, did its work and was ready to report; because such committee usually resolved itself into one member, and he was the one; for the reason he took hold with more zest, proceeded more promptly with the matter in hand; took all the burden on his own shoulders, and left the other members of the committee in the back ground. All were only too willing he should do so, for they knew the work would be better done by him alone, than with their help; and all

had confidence in him, and too much respect for his ability to fear of anything being wrongfully done or neglected.

He was modest to an extreme, and seemed not to think of self. Never tried to push himself into public notice, or to make himself heard, but listened patiently to others, and respected the opinions of all. This was noticeable in a great degree. But when he spoke, it was with deliberation. His opinions were matured, and the hearer felt he was listening to one who knew what he was talking about. He knew all he pretended to know, and underrated his knowledge, rather than over-estimated it. From this fact, others appreciated him the more, and he was given honors and positions which many with more pretensions but less true worth, had sought in vain.

Another of Duncan Putnam's traits of character, and one always greatly to be desired, was his evenness of temper. Nothing seemed to throw him off his balance or disturb him. The thousand little vexatious things which constantly arise and fret most of us, he received with unconcern, and brushed aside. He never seemed to think an annoyance had anything to do with him; but took it up, looked it over, examined it as he would a troublesome insect under his microscope, and then laid it aside. Contrary winds which interfere with our work, and so often make most of us lose a little self-control, were about the same to him as a storm among Jupiter's clouds. This trait made him always pleasant to meet, and easy of approach. Though easy of approach, he was difficult to reach, for no matter how much he imparted, or how thoroughly you believed you appreciated him, he always seemed to hold a reserve of thought which made you feel he was still beyond your reach.

Often when a man of eminence dies, we say: "there is no one to take his place," still his place is soon filled. Will this be true of the great vacancy left in our Academy by the death of its President? It is almost impossible. Two such cannot come into the life of an Academy. No one can fill his place. Some persons may, but no one person can. It is to be hoped the work will go on as well now, as it has heretofore; but the labor of more than one brain will be required to do what he did. Genius was the momentum that enabled him to do the work, which will now require a larger body to accomplish; because there is less momentum.

It is to be hoped that, when Duncan Putnam was taken from us, his mantle dropped to rest upon others, who will be endowed with power to carry on the work of the Academy as he would desire it. Now that he is gone we should feel more than ever, there is something for

us to do, in trying to fill his place. And as we think of his earnest and fruitful work, may we appreciate how much can be accomplished by devotion and persistent effort, and nerve ourselves to the work of building up the Academy as a monument to him whose name will ever be associated with it; and to whom such a memorial would be more pleasing than any mausoleum.

Address of Dr. E. H. Hazen.

Then followed an address by Dr. E. H. HAZEN, who spoke in fitting terms of the faithfulness and patient industry of the deceased, and of his many admirable qualities of mind and heart. The doctor dwelt on the career of the deceased, his early leaning to entomology, his arduous pursuit of knowledge in spite of bodily infirmities, until his name became respected throughout the civilized world. He emphasized the importance of hygiene as a foundation for all other science, the religion of physical development as a basis for the highest achievement, the most perfect intellectual and moral life. As this thoughtful address has not been prepared for publication, it is necessarily omitted.

Address of James Thompson.

Mr. JAMES THOMPSON, one of the first members, and an earnest supporter of the Academy, was then called upon and after remarking that nothing would have induced him to face such an audience but his love of the deceased, delivered the following address :

In the days of the Academy's babyhood, when two or three used to meet in an upper room, and every one contributed what little he could, I was tempted to write and read a paper entitled "Glimpses of Science as seen by a Tyro." I apologized for so doing by referring to an old custom in Scotland, that every traveler in passing some noted spot by the wayside has to throw a stone on the heap, thus helping to raise the cairn to the memory of whatever it was to be remembered—the first stone-age commencement of monuments.

After the meeting, Duncan Putnam, then a mere lad, remarked, in his bashful, modest, and laughing way, that he was also a tyro, but he hoped to be able to cast a little boulder on the cairn before long.

Mr. Pratt, I think, laughed and said he thought Duncan would be able to furnish a few *shells* after awhile. He had just begun then to go out with Mr. Pratt hunting shells.

But who would have thought then (unless it might have been the dream or hope of a fond mother), that he would have furnished such a number, not of rough boulders, but finely hewed, polished, living, speaking, stones to this scientific monument of ours, planned in his own brain, prepared and built in with his own hands, written and printed documents with his own press, and sent them out to be seen and read of all men, in all lands.

This part of his work is finished, and well done it is; and I, though older, still a tyro, would like to throw this, my little rough boulder, on the cairn we are this evening raising to the memory of him who no longer *visibly* presides over our meetings.

"Ach, Gott!" as Carlyle says, "What a mystery is life?" There is no death!

"The dust we tread,
Shall change beneath the summer showers
To golden grain and mellow fruit,
Or rainbow-tinted flowers."

In fact, so much of his life is inseparable from the surroundings here, we feel, with Longfellow, that

"His presence fills this room to-night,
A form of mingled mist and light
From that far coast.
Welcome beneath this roof of mine,
Welcome! this vacant chair is thine,
Dear guest and ghost."

And could, if we had ears fine enough, hear him tell us in the language of the author, of "*The Light of Asia*," speaking of his frail body:

"'Tis a hut which I am quitting,
'Tis a garment no more fitting,
'Tis a cage from which, at last,
Like a bird, my soul has passed.
Love the inmate, not the room,
The wearer, not the garb; the plume
Of the eagle; not the bars
That kept him from those splendid stars!"

If we live in deeds, *not* years; in thoughts, *not* breaths; in feelings, *not* in figures on a dial; if he lives most who thinks most, feels

the noblest, acts the best—then was Duncan Putnam old and full of years, and went hence like a shock of corn, fully ripe.

It is well! Most of those who began this institution have passed the meridian, and the shadows cast by the western sun, come creeping towards them, and lengthening as they come. 'Tis also well! And I will end these desultory remarks by imagining Duncan saying to us, in the lines of Oliver Wendell Holmes, entitled

NOT FINIS:

“Brothers, farewell! The fast declining ray
Fades to the twilight of our golden day.
Some lessons yet our wearied brains may learn,
Some leaves, perhaps, in life's thin volume turn.
How few they seem, as in our waning age
We count them backwards to the title page.
Oh! let us trust, with holy men of old,
Not all the story here begun is told,
So the tired spirit, waiting to be freed,
On life's last leaf, with tranquil eye shall read,
By the pale glimmer of the torch reversed,
Not FINIS, but the END OF VOLUME FIRST!”

Impromptu Addresses.

At the close of Mr. Thompson's address impromptu tributes to the memory of Mr. Putnam were delivered by several persons present. Prof. J. B. Young spoke of him as a scholar—one of the most talented he had known in twenty years experience as a teacher. He said the deceased was characterized by earnestness of purpose, strict integrity, and the highest type of honor. Prof. Riepe, his first teacher, was called upon but excused himself because his “heart was too full to permit of his speaking.” Dr. J. J. Tomson, who had been his attending physician, spoke of his high personal regard for the young scientist, whose mind and attainments were indeed remarkable. The doctor said the deceased was modest, unselfish, and a true scientist. He had never known him to say aught against any one. The speaker thought the career of the deceased should stimulate young men to greater industry and honor.

Correspondence.

A large number of letters from friends of the deceased abroad were then read. From among these the following have been selected for publication:

FROM PROF. SPENCER F. BAIRD, Secretary Smithsonian Institution, Washington, D. C.

SMITHSONIAN INSTITUTION, WASHINGTON, D. C., Dec. 20, 1881.

SIR: In acknowledging the receipt of your letter of the 10th inst., which conveys the painful intelligence that Professor J. D. Putnam, President of Davenport Academy of Sciences, has been called from his earthly labors, I beg to say that while, through this dispensation of Providence, the Academy sustains a double loss, in that by the death of Prof. Putnam it is deprived of an honored presiding officer, and at the same time of an associate who was ever zealous for the success of the establishment, the cause of science is again called upon to mourn the departure from earth of a devoted friend and conscientious collaborator.

Begging that you will convey to the members of the Academy, and to the family and friends of Professor Putnam, the assurance that in their bereavement they have the profound sympathies of the officers of this institution,

I am, very truly yours,

SPENCER F. BAIRD, Sec'y.

W. H. PRATT, Davenport, Iowa.

FROM PROF. ASA GRAY, Cambridge, Mass.

CAMBRIDGE, MASS., January 4, 1882.

MY DEAR SIR: I learn that a meeting of the Davenport Academy is convened to take notice of the death of its late Corresponding Secretary, Mr. J. Duncan Putnam. It is well that you should put upon record, for future times, some memorial of the services and the character of the associate who is now lost to you. Young as he was, I suppose he is to be ranked among your founders; at least, his place in your history is a very early one. Of what he did for your society, of what he accomplished for science, of the serious disadvantage under which he labored in doing this from almost life-long ill health, of the enthusiasm which supplied the place of bodily strength, and of the fruits of his devotion which you are enjoying in the prosperity and good name of the Academy, it is quite unnecessary that I should write a word. His name and place in the science which he pursued with such devotion are made sure by being incorporated into the imperishable records which Natural History builds into its very fabric as its structure rises through the combined labors of all its gifted devotees. Let me only say, that what struck me in my intercourse with Putnam, was his sobriety of judgment and simplicity of spirit. Never have I seen a cooler, and, as we say, more level, head borne upon such young shoulders, nor is it often that such gifts and acquisitions as his are borne with such genuine modesty by one so young and so situated. Little as I have actually been with him, I

feel that I have lost a valued friend. Yet it was all along evident that he could not remain long with us; and thankful should we be that even that brief span was protracted quite beyond all ordinary expectation.

Very truly yours,

ASA GRAY.

MESSRS. PRESTON, LYNCH and FULTON,

Committee of the Davenport Academy of Natural Sciences.

FROM GEORGE ENGELMANN, M. D., ST. LOUIS, MO.

ST. LOUIS, MO., January 6, 1882.

MESSRS. PRESTON, LYNCH AND FULTON, Committee:

GENTLEMEN: Your letter of invitation was unfortunately mislaid, and I am thus prevented from being present, even by this my answer to your invitation, at the memorial meeting in honor of my late friend, the President of your Academy, J. Duncan Putnam.

I heartily sympathize with you and your institution in the irreparable loss you have sustained in the demise of your gifted young President, whose talents, zeal, and energy have already made him conspicuous, and would have achieved great success in science if a longer life had been vouchsafed to him.

Accept my sincere condolence for the great loss you, and with you science, has sustained in the death of young Putnam.

Yours respectfully,

G. ENGELMANN.

FROM PROF. SAMUEL H. SCUDDER, Cambridge, Mass.

CAMBRIDGE, January 7, 1882.

MESSRS. C. H. PRESTON AND OTHERS,

Committee of the Davenport Academy:

GENTLEMEN: I regret it will not be in my power to attend the meeting you propose to hold on the 12th inst. I should be glad to testify by my presence the esteem in which I have ever held Mr. Putnam, both as a personal friend and as a fellow student of nature. The persistent energy with which he not only undertook, but carried to completion, investigations of a serious and difficult nature, when his time was so largely occupied in the administration of a public trust of which he was, perhaps, the main stay, and all while laboring under the heavy disadvantage of a serious and wearing malady, can only be fully appreciated by those who understand the tax upon his strength which each of these entailed. They bring out, too, into clearer relief and more vivid light, the purity of his purpose, and, to those who knew him best, the gentleness of his character, which made intercourse with him a delight. Many a man of vigorous constitution would have shrunk from the labors he gladly undertook; few would have accomplished them so well. To us at the East, at least, who look upon your affairs at a distance, and, as it were, by a bird's-eye view, it seems as if, without him, the Daven-

port Academy never would have had half so vigorous a growth, nor proved so timely and beneficent an example to the younger communities of our country. His efforts and example have surely given it an impulse which will long enable it to sustain the character it enjoys; let us even hope for something better. At the same time his writings are among the most scholarly achievements of the scientific men of the Western States, and show him to the world a modest and safe pioneer in paths of his own choosing. It is earnestly to be hoped that he left his material for the long looked for monograph of the *Solpugidae* in such shape that the Academy can give it to the world at an early day, and that the Academy will feel this a trust which it cannot rightly fail to assume.

With thanks for your kind invitation I remain,

Very respectfully, yours,

SAM'L. H. SCUDDER.

From DR. H. A. HAGEN, Cambridge, Mass.

CAMBRIDGE, MASS., December 22, 1881.

MRS. C. E. PUTNAM: DEAR MADAM—Your paper with the very sad news of the death of your excellent son has arrived. I was entirely unprepared for the sad event just now, though some years ago I could not believe that he would be able to live a few months longer. But as he had recovered last year in a remarkable manner, I had the hope he would go on better and better.

I had the honor to know your lamented son for a number of years. The first letter gave to me a strong belief in his earnestness and capacity so that my answer was prepared with great care and industry.

His extreme modesty and the lack of any pretention except to advance science, is in some manner unrivaled. His scientific work shows most clearly that American science has lost a very prominent student. I think he could not have had an enemy!

You will be assured that I feel very strongly how much you have lost.

Yours, very respectfully,

DR. H. A. HAGEN.

From C. V. RILEY, U. S. Entomologist, Washington, D. C.

WASHINGTON, D. C., December 31, 1881.

GENTLEMEN: AS I cannot be present at the meeting of the members of the Academy which is to be held in memory of its deceased President, Mr. J. Duncan Putnam, permit me, in this way, to express my deep-felt sorrow at the death of a friend whom I esteemed, and one so untiringly and unselfishly devoted to the interests of Natural Science, and so beloved by all with whom he came in contact. Of late years he battled so bravely with suffering that each time I have met him since our first meeting in 1873, he seemed improved in general health and strength, and when at my house not many

months since, I felt a strong hope and belief that his persistent and unclouded mental activity, and his enthusiastic love of nature, by leading him into field and wood, and obliging that out-door activity so essential to the valetudinarian, would ultimately conquer the disease he suffered, so that many years of usefulness might yet be spared to him. The news of his death came therefore as a shock. All who knew him will mourn his loss, and it can be said of few as it can of him that he never made an enemy—never did a wrong! Pray, tender my heartfelt condolence to his bereaved parents and relatives, and believe me,

Yours, respectfully,

C. V. RILEY.

C. H. PRESTON, E. P. LYNCH, H. C. FULTON,
Davenport, Iowa.

From HY. EDWARDS, Entomologist and Editor of "*Papilio*," New York City.

185 EAST 116 STREET, NEW YORK, December 22, 1881.

MY DEAR SIR: It was with no common sorrow that I received the sad news of the death of my valued friend, whose loss you must all so deeply mourn. To offer consolation at such a time is I know useless, but one always longs to say a word that may relieve the anguish of grief, and I can only say, that I feel, most truly in the depth of my heart, that "There is no death; what seems so is transition," and that he whom we loved, is as much with us now as he ever was, working as earnestly as ever, patiently as ever, bending his energies to his self-imposed tasks, and appreciating and returning the affection and care which always surrounded him. A few years more, and we shall all pass the barrier which divides us from that "unseen land," and then we shall clearly see that the life here to which we cling so fondly was but the beginning of our existence, a school to prepare us for the truer life beyond. * * * *

I have written a short biographical sketch for "*Papilio*," which I will send you when printed.

Believe me, my dear sir,

Yours, most sincerely,

C. E. PUTNAM, Esq.

HY. EDWARDS.

From PROF. B. PICKMANN MANN, Entomologist, Washington, D. C.

WASHINGTON, D. C., December 26, 1881.

MESSRS. C. H. PRESTON, E. P. LYNCH, AND H. C. FULTON,
Committee of the Davenport Academy of Natural Sciences.

DEAR SIRS: Your invitation to me to be present at the meeting to be held January 6, 1882, in memory of the deceased President of the Davenport Academy of Natural Sciences, Mr. J. Duncan Putnam, is received. I regret that I cannot be present in person, to testify to my deep respect for Mr. Putnam, and my sincere friendship for him. No words of mine, however, could add to the genuine admiration of his character and attainments which must be rife in your midst, where he was best known. For many years I

have had the pleasure of friendly correspondence and occasional personal intercourse with him, and have admired and loved him from the beginning, for his earnest purpose, conscientious and enthusiastic performance of the duties he has undertaken, and great modesty. I have esteemed it a privilege and an honor to be associated with him nominally in some of the work which I have done myself. And in testifying to his noble qualities it gives me pleasure to recognize the influence of his mother in the formation and fostering of that character.

Very respectfully, yours,

B. PICKMAN MANN.

From PROF. A. S. PACKARD, JR., Editor American Naturalist.

PROVIDENCE, R. I., January 2d, 1882.

C. H. PRESTON AND OTHERS,

Committee of the Davenport Academy of Natural Sciences:

GENTLEMEN: Allow me by letter to express my sense of the great loss experienced not only by the Academy, but also by the city of Davenport, and the State of Iowa, in the death of so active, public spirited, unselfish a man as the late J. Duncan Putnam. It is rare that so young a man, so modest and retiring, rather a student than a man of affairs, impresses himself upon a community in so marked a manner. I knew Mr. Putnam personally, having met him once, and also by letter. Our studies were on kindred subjects, and I entertained a high regard for his zeal, accuracy and conscientiousness in research. I have watched with much interest his career, his public spirit in building up the Academy, which owes so much to his untiring efforts. We cannot cherish too carefully the memory of such men who are in a new country devoting themselves to the pursuit of truth for its own sake, to the cause of higher education, to all that tends to elevate mankind, and makes the world better and happier. His monument has already been erected in the scientific papers he has left behind him, and in the Academy of which, if I mistake not, he was one of the founders, and whose building he was so largely instrumental in erecting. His memory should be cherished, and his example be imitated by the young men of his city and State.

I am, with great respect,

Very truly, yours,

A. S. PACKARD, JR.

From HENRY ULKE, Washington, D. C.

WASHINGTON, D. C., January 3d, 1882.

GENTLEMEN: Your kind invitation to be present at the meeting to the memory of your late President of the Academy, J. Duncan Putnam, has been received, but I am very sorry to say, that time and circumstances will not permit me to join you on that occasion.

In Duncan Putnam I have lost not only a dear good friend, but also an ardent fellow laborer in the field of entomology. His loss to this branch of science is really great.

His collections in Utah for instance, which were placed in my hands for investigation, not only yielded entirely new material, but have thrown more light upon the geographical distribution and conditions of former geological periods, than any collection, made by others in our Western States. Any formal expression as to the loss of our esteemed friend, which may emanate from your honorable body, is heartily approved by

Yours, respectfully,

HENRY ULKE.

No. 1111 Pennsylvania Avenue.

From Prof. EDWARD L. MARK, Cambridge, Mass.

48 SHEPARD ST., CAMBRIDGE, MASS., Dec. 24, 1881.

MR. AND MRS. PUTNAM: I trust you will pardon this intrusion. The news of your son's death is indeed sad information.

I had learned from correspondence and a short personal acquaintance with him not only to greatly admire his scientific industry and his many acquirements, but also to have an affection for his manly character, those personal elements which involuntarily either attract or repel those about one. His work can only stimulate his scientific acquaintances to more worthy exertions. His personal example can only urge upon us a more modest and manly bearing toward our fellows.

In your loss you have the warmest sympathy of one who ventures to call himself your friend.

EDWARD L. MARK.

From Prof. W. J. McGEE, Geologist, Farley, Iowa.

FARLEY, IOWA, January 5th, 1882.

DR. C. H. PRESTON, Davenport, Iowa:

MY DEAR SIR: I deeply regret my inability to attend the memorial meeting to which you kindly invited me; for I fully realize that in uniting with you in honoring the memory of the late Professor J. Duncan Putnam, I would but add to my own fame.

I cannot but feel that the State at large, as well as your own city, has sustained an irreparable loss in the death of the President and (I may, I think, without injustice to your other members, add) moving spirit of the Davenport Academy of Sciences—that institution which has, in giving the world an inimitable example of typical western enterprise directed to the promotion of science, caused our name to be spoken by scores of men in every civilized land. With every intelligent citizen of our commonwealth I sincerely trust that your severe bereavement may not so blast your enthusiasm and paralyze your energies as to allow the Academy to be permanently crippled. As a student of science, too, I keenly feel the loss of a fellow-worker, who, though he struggled beneath a weight of suffering such as few are called upon to bear, did so much to increase the bounds of human knowledge. Our ranks are all too sparsely filled, and we can ill afford to spare the flower of our little band. But my own sorrow is not alone the selfish sorrow

of a citizen of an afflicted State, or of a worker whose yoke-fellow is taken from him; I mourn the death of a personal friend. Though I first met Professor Putnam within a year, our community of feelings and interests was so perfect, our associations so uniformly harmonious, and our intercourse so intimate, that my feeling for him was that of a man for his well-tried friend. Thus, as a fellow-citizen, as a fellow-worker, and as a fellow-mourner, I join with you in bearing his well-earned laurels to the tomb of our honored associate and leader.

Sincerely yours,

W. J. MCGEE.

From Dr. H. I. BOWDITCH, Boston, Mass.

BOSTON, January 21, 1882.

DEAR MADAM: I presume I owe to your thoughtfulness the receipt of the Proceedings of the Davenport Academy of Sciences. The tributes paid to the dear youth were most appropriate. What a brave, uncomplaining, but ever-working youth he was!

He has done more in his short life and while in ill health, than most people do in a long life of health. I *cannot* associate sorrow with such a life and such a death. Such souls seem ever to minister to those who are left.

I congratulate you, my dear Madam, for the great fact, which is granted to but few mothers, of having given birth to, and having loved and lived with so long—such a son.

I remain, my dear Mrs. Putnam,

Very truly, and with great sympathy,

HENRY I. BOWDITCH.

From Baron R. OSTEN SACKEN, formerly Secretary of Legation, Russian Embassy.

HEIDELBERG, GERMANY, Jan. 31, 1882.

DEAR MRS. PUTNAM: You will easily understand with what feelings I have heard of the death of your dear son. The five or six years that had elapsed since I last saw him, and the constant proofs of his activity in the field of science which I could witness, had made me believe and hope that he had gradually overcome the delicate state of health in which I had seen him. But it was not so, and we have to submit to this, as we have to so many other trials in this life. Please accept for yourself and husband the expression of the most sincere condolence of one who has a grateful remembrance of your kindness to him! Whether it will ever be given to me to cross the ocean again I do not know; but I feel that my best friends are on the other side of it. * * * If you should ever visit Europe, please let me know it and I will try to meet you. The two numbers of the "Star of Woodlawn," which you gave me, have a well defined place in my library and refresh my memories from time to time of your happy family circle.

Believe me, ever sincerely and faithfully yours,

R. OSTEN SACKEN.

From JOSEPH L. BARFOOT, Salt Lake City.

SALT LAKE CITY, UTAH, Dec. 28th, 1881.

Chairman of Committee of Academy of Nat. Sciences, Davenport, Iowa:

DEAR SIR: As a member by courtesy of your Academy, permit me to state how deeply I sympathize with you in the death of your late President and fellow worker, Joseph Duncan Putnam. I first became acquainted with Mr. Putnam in our museum where he did much useful work in entomology, which remains on exhibition, as a memento of his ability in that department of Natural Science, and willingness to aid in the cause of education in Utah. This entomological cabinet was made specially for the groups of Utah insects after Mr. Putnam left this city. It was noticed (among other naturalists) by Baron Osten Sacken, and a note made of the interesting collection. Brother J. Duncan Putnam suffered when he was here, but he was so patient that one could get him to expatiate upon anything rather than his sufferings. It was impossible to do otherwise than love him. While I feel keenly the loss of my esteemed friend, I shall still take an abiding interest in your Academy, and shall be pleased in aiding you in any direction you may indicate, as far as in my power.

I remain yours, very respectfully,

JOSEPH L. BARFOOT, Curator.

DR. FARQUHARSON.

From C. E. BESSEY, Professor of Botany, Iowa Agricultural College.

AMES, IOWA, Dec. 13th, 1881.

MRS. PUTNAM—DEAR MADAM: It is with great sorrow that I hear the news of our great loss, in the untimely death of your gifted son, J. Duncan Putnam, whom we had learned to love and honor. I join with you in mourning his loss, and in deploring the cruel fate which has robbed Iowa of one of its brightest lights.

I shall call for fitting resolutions by the Iowa Academy of Sciences, (of which he was an honored Fellow), at its next meeting.

May the God of our fathers be with you in your great sorrow.

Sincerely, yours, C. E. BESSEY,
President Iowa Academy of Sciences.

From Prof. J. HENRY COMSTOCK, Entomologist, Cornell University.

ITHACA, N. Y., January 10, 1882.

MRS. M. L. D. PUTNAM, Davenport, Iowa:

MY DEAR MADAM— * * * The news of the death of your son was a very great shock to me. I feel it as a personal loss. Since his visit to Washington, where we first met, I have counted much on his friendship, and now I feel his loss most deeply. You have the most sincere sympathy of all who knew him.

Yours, very truly,

J. HENRY COMSTOCK.

From Dr. H. H. BEHR, Entomologist San Francisco, Cal.

SAN FRANCISCO, Jan. 23d, 1882.

DEAR FRIENDS: It was with feelings of the deepest regret that I read of the demise of my friend, Joseph Duncan Putnam. His death is a loss to science. We mourn in his death the loss of an acute observer and original investigator, that by a longer life would have bestowed immense benefits not only to theoretical knowledge but also to the practical manipulations of the agriculturist and horticulturist. It is only a short time ago that I had to refer to his publications on the *Lecanium* group. Now the eye of the talented observer is closed; the ready pen in the hand of the investigator is laid low; that soul so full of enthusiasm is gone to other realms, and the work half done waits for a mind like his.

I am sorry not to know the exact address of Mr. Putnam, Sr., or else I would have expressed my condolence to him individually.

Yours, truly,

H. H. BEHR, M. D.

From HERMAN STRECKER, Entomologist, Reading, Pa.

READING, PA., January 14th, 1882.

MR. AND MRS. PUTNAM AND FAMILY:

DEAR FRIENDS—But a few days after the sad event I learned that your son and brother, my friend Duncan, had left us; that the poor, racked, wearied frame was at rest, and that nevermore in this world would we see his calm, thoughtful face. Many thoughts arose, and followed fast each other. Phantasmagoria-like flitted before my mental vision the incidents of his short visit here; the pleasure he took in examining all the wonderful insects and books; his gentleness and humility; then the single dinner he and I made off a steak and coffee, "not various, but good," as he said. Then again later, his persistent, steady work in the scientific publications, and all else pertaining to the society of which he was the real founder. Green will his memory ever remain with those who had the good fortune to be brought in intimate relations with him. * * *

I know how utterly powerless is all language to express what we feel, or to alleviate the agony. Time alone, in a measure, may deaden the acuteness of the pain, but will never obliterate the remembrance of the goodness of those who have been given to earth and heaven.

Poor dear friend! I had hoped that he would live a number of years yet; and had consumption been the sole disease he would have done so. But he is gone; and though neither sorrow nor tears will avail to bring him again to us, still the thoughts of his purity, his unselfishness, of his usefulness and talents, will last with the many who knew him, till they have fulfilled their mission and passed into eternity.

Dear friends, with heart-felt sympathy, and trusting that I may sometime receive word from you, believe me,

Most sincerely, yours,

HERMAN STRECKER.

From DR. CHARLES BARROIS, President Geological Society, Lille, France.

[Translation]

LILLE, FRANCE, 9 January, 1882.

MR. C. E. PUTNAM:

MY DEAR SIR: I learn from a journal of the sad event which has plunged your whole family in sorrow. The death of a man of such promise as Joseph Duncan Putnam, is one of those misfortunes which extends beyond the domestic fireside. The loss which afflicts you will be much felt by all those who like myself have been able to know and value his knowledge and his character.

May the unanimous regrets of all those who knew him, somewhat console you in your trial. That short life, so well filled, will be an example to his young brothers, who have already received from their mother so admirable an education.

Accept, dear sir, for yourself and for your family, my most sympathetic compliments and condolences.

CHAS. BARROIS.

From DR. C. C. PARRY, Colton, California.

COLTON, CALIFORNIA, December 24th, 1881.

MESSRS. C. H. PRESTON, E. P. LYNCH, H. C. FULTON,

Committee Davenport Academy of Sciences:

GENTLEMEN: The request conveyed through you from the Davenport Academy of Sciences, that I should "prepare and present a paper" at the special meeting to be held January 6th, 1882, in memory of our late lamented President, J. Duncan Putnam, coincides with my own earnest wishes, and enlists at once my most devoted efforts. But to do justice to *such a character*, to portray as it should be done, the life and labors of *such a man*, an intimate friend, and a faithful fellow-worker in the cause of science, requires more careful consideration, and access to written records that are not now within my reach. I would therefore respectfully ask to be granted a longer time, and opportunity for the performance of this duty you have thought fit to impose upon me. Leaving this matter to your farther discretion, allow me at this time to join my sorrowing lamentations with yours, over the untimely grave of our honored President, associate and friend.

Very respectfully, yours,

C. C. PARRY.

BIOGRAPHICAL SKETCH

AND SCIENTIFIC CHARACTER OF JOSEPH DUNCAN PUTNAM, LATE
PRESIDENT OF THE DAVENPORT ACADEMY OF
NATURAL SCIENCES.

BY DR. C. C. PARRY.

[NOTE.—The Biographical Sketch of JOSEPH DUNCAN PUTNAM, as hereinafter given, was prepared by Dr. C. C. Parry, by request of the Memorial Committee, and presented at a special meeting of the Academy, held September 22d 1882.]

A duty that has long weighed on my mind as a not remote possibility, now calls for a present fulfillment at my hands. Accepting the invitation of the memorial committee to prepare a biographical sketch of our late associate, and President, I am prompted not less by a personal desire to do justice to his memory, than by a profound conviction that I am thereby complying with his own unexpressed wishes. I conceive that I shall be able to fulfill most satisfactorily the duty thus imposed on me, not by attempting a detailed biography, the ample material for which is spread over a most extensive and exhaustive correspondence, preserved with scrupulous care and exactness, but rather by drawing from various sources partly within my own personal knowledge, the salient points that mark the development of his mental character, and have left their lasting impress on his scientific work.

At noon-day on the 18th of October, 1855, in the mansion of the late Governor Joseph Duncan, at Jacksonville, Illinois, Joseph Duncan Putnam, a descendent in the second remove from this pioneer western statesman, first saw the light.

Inheriting no doubt not a few of the ancestral traits that belonged to his distinguished parentage, though not destined to figure in the ranks of statesmanship, he was called in the no less honorable annals of science, to occupy a page reflecting credit upon the two historic names he bore.

From this shaded rural retreat, to which his boyish feet often returned, to enjoy its stately quiet, and to catch the early inspiration of that external nature which afterwards absorbed the energies of a vigorous mind, he was taken to his childhood home on the western banks of the Mississippi.

Davenport, Iowa, will hereafter claim the honor of nurturing this noble spirit, devoted to unselfish ends, striving amid manifold weak-

ness, with all the powers of a gifted mind to do his part in kindling and elevating the torch of science in this land of his birth. When the corner-stone of that commodious building, the first Academy of Sciences erected on the west bank of the Mississippi,—and whose erection is largely due to his persevering efforts—shall be again laid bare for the construction of a grander edifice, from that recess will be unsealed the record of a young life literally given to science, and those yet unborn will bend with silent and reverent regard over the time-stained records that tell of the devotion, self-sacrifice, and earnest work of the youngest, the most efficient, and noblest of the founders of the Davenport Academy of Sciences. But *now* from our present stand-point, in the year of grace, 1882, let us take a brief backward glance at the various elements that have conspired to mould the character we here delight to honor.

From hereditary sources we all alike derive the substantial elements, mental and physical, that form the basis of our individual characters. This inalienable legacy that thus comes down to us, impossible to trace to its ultimate origin, represents the combined results of organism, moulded by all the circumstances through which it has passed, and as we have a right to believe directed by an all-wise Providence to beneficent results.

So, clearly in the subject of our sketch, the ability to think, to organize, to accomplish results; nay, even the thirst for knowledge, the love of truth, the sense of justice, and the yearning to do good to his fellow men, was an inheritance to which in the brief interval of a fleeting life, he added what he could, and so closed up the account. But aside from these essential, though incomprehensible elements largely determining the character of our departed friend and associate, there were evident circumstances attending his advent, that must needs have exerted a marked influence on his mental development.

The unparalleled discoveries which marked the early periods of the nineteenth century, were in its advancing epochs bearing fruit in improved means of living, vastly increased appliances for investigation, and a more profoundly practical philosophy. Such a condition of things working on an appreciative and prepared mental endowment, ensured results such as we shall have occasion to note in the subject of our biographical sketch. More than this, a family atmosphere in which the freest movements of natural bias were not only allowed but encouraged, ever surrounded the growing boy with an unfailing inspiration, and while in other directions apathy and

indifference may have exerted a depressing influence, there was at least one heart nearest to the source of life, that never failed in its unwavering encouragement, its proud appreciation and unfaltering devotion. Without wishing to intrude within these sacred precincts, it is not too much to say that the boy became what he was, and accomplished what he did largely through the direct influence of a mother's love, an influence in fact recognized by him in not a few touching incidents in his later years, and by no means to be omitted in any appreciative notice of his progressive life.

With these preliminary considerations having a direct bearing on our general subject, we are now prepared to follow up the successive steps by which his brief history is marked.

The sylvan shade of his accidental birth place was not long after supplemented by an equally attractive home overlooking the picturesque valley of the Upper Mississippi. Here the boy, passing through the usual vicissitudes of childhood, gradually developed his physical and mental faculties under the combined action of common-school education and home influences. It was perhaps not much to his disadvantage that an early constitutional weakness secured more of home education, and less of school routine; a rapidly increasing family of boys, soon afforded the means of diversion, and the stimulus of a variety of tastes and dispositions. These latter were only so far restrained as was necessary for the general welfare, while all needed appliances in the way of books, games, and mechanical apparatus were liberally supplied.

Not averse as it would seem to boyish sports, and especially such as required skill and practical dexterity of eye and hand, he took less delight in more boisterous games, or such as required severe bodily exercise. Surrounded thus early in life by everything to attract the senses and refine the tastes, it is not to be wondered at that the insect world with its strange transformations, its delicate markings, its bright colors, and even its obscure habits of growth, should have engaged the attention of his thoughtful and studious mind.

Accordingly we soon see, in connection with a younger brother, a growing interest in the capture and rearing of moths and butterflies, and during occasional absence a lively boyish correspondence is kept up on the subject of mutual discoveries and observations.

Intimately connected with his future work as an entomologist was an early attention to drawing, at first in the form of grotesque caricatures adapted to the tastes of children, but soon succeeded by a

more careful, pains-taking delineation of natural objects, to be used hereafter as the means of illustrating scientific subjects.

It is not in accordance with the design of this sketch to trace in detail his school life, of which the writer in fact has no personal knowledge, hence it will suffice here to say, that his school life was characterized by studious attention to the concrete subjects of instruction, a considerable indifference shown to the mere technicalities or abstractions of grammar and languages, and a rapidly developed capacity for the neglected branches of natural science; thus whatever had any direct or indirect bearing on such subjects secured his attention far enough to master its practical details, and in applied mathematics, or the modern languages, opening up the broader field of investigation by other minds, he progressed far enough to use them as means to higher ends.

In the spring of 1869, young Putnam, then in his fourteenth year, and attending the grammar school, attracted the notice of Prof. W. H. Pratt, then engaged as writing teacher. This casual acquaintance soon ripened into a lasting friendship, and ere long weekly Saturday excursions were planned to collect shells and other objects of natural history along the course of the Mississippi, or on the line of railroad excavations. An early journal in pencil gives lively details of these explorations, and we see in them the budding inclinations of the young entomologist swelling out under the genial encouragement of his friendly instructor. Naturally in such interviews the existence of a slumbering Academy of Natural Sciences comes to the knowledge of the junior member of the firm, and we note in the records which he afterwards so diligently put in print, the simple announcement that on June 2d, 1869, Mrs. M. L. D. Putnam and J. Duncan Putnam were by *one* vote unanimously elected members of the Academy. To be elected in this latter case did not mean a dead-letter record, and in the same pocket journal we note the following item, "July 9th, 1869, I attended for the first time to-night, having been elected a member of the Davenport Academy of Natural Sciences which holds its regular meetings the last Friday of each month. Father went with me. This was an adjourned meeting to discuss the methods to be used in raising the funds to take photographs of the great eclipse next August, and to hear the report of the committee appointed on the same subject, but no definite action could be taken, so the meeting adjourned till next Friday evening, at 7½ o'clock."

Significant in many ways is this brief record. The Academy of

Sciences was then unwittingly taking into its membership one who was always ready to take "definite action," and who did not put off work to be done till "next Friday evening at 7½ o'clock." From this time on to the close of his life, following up the simply expressed desire to "*do something for science*," an unflagging energy, a growing affection and an untiring working capacity, were devoted to the upbuilding of this central object of his regard.

Furthermore, the father thus casually mentioned in connection with this first Academy attendance, and who was hereafter a constant associate with his youthful son at its monthly meetings, not only lent the moral sanction of his paternal approval, but was ever ready to respond to any appeals for material assistance, even when burdened with the increasing cares of an engrossing business. The financial records of the Academy will show in not a few instances, how the father stood by the son in his struggling efforts to build up the most important interests of the Academy.

It was while still a school boy, the exact date of which is not recorded, that young Putnam had his first and only interview with the gifted and eccentric western entomologist, B. D. Walsh, of Rock Island. This introduction was effected through a favorite teacher, Miss Z. Severance, (now Mrs. I. S. Newberry). A brief account of the interview given by this lady represents a very cordial and mutually satisfactory acquaintance, which was unfortunately not renewed on account of the accidental death of Mr. Walsh soon after.

In 1871, then in his sixteenth year, Mr. Putnam had an opportunity to extend the field of his enlarging observations by a visit to his paternal relatives at Saratoga, New York. At this time he came into intimate personal relations with an experienced naturalist, Dr. R. L. Allen, an uncle by marriage on his father's side. Here he had an opportunity to inspect a natural history collection, and gain free access to a scientific library. He here enjoyed the privilege of meeting on familiar terms the distinguished State Geologist, Prof. James Hall, and also the veteran entomologist, Dr. Asa Fitch, of Salem, New York. The inspiring effect of these interviews was plainly shown in his familiar home letters describing these visits and the impressions made on him. Not satisfied with a mere casual impression, young Putnam eagerly noted the methods of observation and appliances for preserving specimens so important for his future studies. At the same time his active mind was employed in tracing up genealogical records, and refreshing his memory with the historical *data* pertaining to that noted locality.

Returning to his western home, the widening influence of his observations and experiences was made apparent, by an increased interest in the Academy of Sciences. Henceforth a constant attendant on its regular meetings, he gradually took upon him its most responsible duties; elected recording secretary in April, 1871, we note from this date a more careful attention to the often neglected duty of preserving early records, an attempt to condense the subjects presented at the several meetings, a more systematic arrangement of subjects, and promising indications of substantial progress. Some casual remarks in a presidential address on the desirability of securing a permanent home, and commencing the publication of proceedings, were not allowed to remain a mere suggestion, but were kept constantly in view till the proper time arrived for their consummation, and then all the means and appliances at command were brought effectually to bear on the desired results, such as we now witness.

It was in the following year, 1872, that my first personal acquaintance was made with the subject of this sketch. Having been recently relieved from an official position in Washington, I was planning a return to more congenial pursuits in the free atmosphere of the Rocky Mountains. It was at this favorable juncture, that young Putnam offered himself as a companion, thenceforth rarely to be separated, never at least in mutual regard.

Though over thirty years his senior, on the broad field of nature we occupied the same level. Always respectful to my personal wishes or suggestions, never flinching from any imposed duty, always cheerful, hopeful and zealous, he proved a companion worthy of the highest regard, which he never forfeited either by word or deed.

After a short preliminary excursion into a near district in Iowa, which afforded a fair test of his physical ability, we left Davenport the latter part of June, direct for the Rocky Mountains of Colorado Territory. Passing rapidly by rail over the plains of Kansas, we were delayed for a few days at Denver, to complete our mountain outfit. Here in full view of the region we intended to explore, the young naturalist often cast wistful glances towards those cool retreats still flecked with patches of glistening snow, but not to the neglect of the singular district immediately surrounding this embryo city. Accordingly we find in his journal of this date, June 22d, 1872, a record of finding his first specimen of *Galeodes* belonging to the family of *Solpugidae*, intermediate between spiders and scorpions. The peculiar features of this strange insect at once attracted his

serious attention, and having made a drawing of its characteristic anatomical parts, he sent the same to Prof. H. A. Hagen, of Cambridge, Mass., suggesting at the same time its affinities and proper place in classification. Prof. Hagen's answer promptly made, confirmed his first impressions, and from this time never losing sight of the subject thus casually brought to his notice, he followed up its written literature, corresponded with foreign collectors, consulted extensive libraries, bought rare books, and secured from every available source, including his own subsequent collections all the accessible means for illustrating this class of insects, intending eventually to bring out in the Proceedings of the Davenport Academy, a monograph of North American *Solpugidae*.

But now all preliminaries having been arranged, on the first day of July we left for the mountains, intending to follow on foot the track being opened for the construction of a narrow-gauge railroad, up Clear Creek.

Toiling in the rear, with his collecting net, attracted by the strange scenery and insects that buzzed about his path, the distance between the two companions continually widened, and at dusk a point was reached where rugged and precipitous walls hemmed up the way not yet penetrated by the graders; still hoping by following the survey stakes to come into a more open country, and possibly a settlement, night closed on us still separated. Not unaccustomed to such emergencies, the senior selected his night bivouac where abundance of dry wood afforded at least one source of outward comfort, as well as a hope of attracting his companion, but night passed without meeting, and my young associate passed his first night in the mountains under the shelter of an overhanging cliff, without either food or fire! After meeting the next day in the upper settlements, which we reached by different routes, on comparing notes we found that the actual distance separating us was the nearly perpendicular mountain height of the gorge, my companion remaining at the foot of the precipice, while his comrade climbed to the summit.

From such an unexpected test of physical endurance, I was well satisfied that my young friend could be depended on for all that was required in the way of mountain climbing.

Needless to dwell here on the details of that glorious summer in the mountains, so copiously described in his home letters, how together, or separately we scaled precipices, visited the haunts of the ptarmigan and the mountain sheep, enjoyed appetizing lunches on alpine slopes, redolent with rainbow colored flowers, attractive alike

to climbing botanists and gay butterflies; what solid rests we enjoyed in our lowly cabin, lulled by the unceasing dash of the snow-fed Mad Creek. All these and much more go to make up a fund of pleasant recollections, the record of which would lengthen out too far this memorial sketch. Still in this connection it would be hardly proper to omit reference to the visit at our cabin of the distinguished botanists, Dr. Torrey and Prof. Gray, the latter of whom we accompanied on Gray's Peak, and had the pleasure of piloting over mountain steepes these veterans who had many years before been our guides on the heights of science. An association with such men, under such circumstances, could not fail to exert an inspiring effect on the susceptible mind of our young associate.

Almost reluctantly at last, in obedience to the warnings of an approaching winter, we took refuge on the plains below, and on October 1th reached our respective homes on the banks of the Mississippi.

The results of this trip were shown in the securing of a large and valuable amount of entomological material to be classified and studied the coming winter, together with the more valuable acquisition of enlarged experience, and an expansion of mental power.

The winter of 1872-3 devoted to this necessary work, was also largely occupied in carrying on a rapidly increasing correspondence with cotemporary entomologists, and submitting the different orders of insects collected, to specialists. As a slight relaxation from this serious work he undertook in connection with other members of the family the printing of a home journal, appropriately named "*The Star of Woodlawn*," thus perhaps without any definite intentions, deriving a valuable experience, which proved eminently useful in the more important work he was soon to undertake, in publishing Academy Proceedings.

With the opening spring an opportunity offered and was eagerly embraced to extend his traveling experience by accompanying a military expedition under command of Capt. W. A. Jones, to the Yellowstone National Park. The duty assigned to young Putnam on this trip was that of assistant meteorologist, which literally implied the carrying a mercurial barometer over this rugged country, keeping up a regular meteorological register, in addition to such observations as came more directly in the line of his tastes as an entomologist. That he performed these duties faithfully is sufficiently evidenced in the official approval of his commanding officer. As his companion on this trip it was pleasant to note a fuller development

of the manly traits of self-reliance, and a resolute determination to improve to the best advantage the means afforded for increasing his geographic and scientific knowledge. He would no doubt have accomplished more in his favorite science, if he had been less hampered by other duties and the necessary restraints of military discipline.

Still the natural wonders of that strange region embracing the Geyser basin, and the magnificent Yellowstone Lake, had an enlivening effect on his susceptible mind, and possibly kept out of view a constitutional weakness that was even then making inroads on his physical powers. No special direction to any particular line of study was noticeable from this expedition, except a more careful attention to meteorological observations on his own account, favored as it subsequently was by the possession of a very complete set of meteorological instruments. Returning home from this second western trip in which he had the satisfaction of more than meeting his personal expenses, his continuous field observations quickened a natural desire to make them more useful by a thorough course of scientific training. He accordingly undertook the necessary preparation for Harvard University, till all his plans were suddenly suspended by a severe hemorrhage from the lungs. Thus reminded that an active mind requires for its efficient development a sound and vigorous body, he was brought face to face with the neglected subject of personal health, and subjected to the wearying, but often necessary discipline of weakness.

It may be difficult to see in this apparently thwarting experience, in one so young and promising, any real compensation—long days of weariness with utter inability to accomplish a work that seemed waiting for just such a worker, a willing spirit in a slender frame that could not endure the rack of labor. Still there was plain to be seen a growth of moral power, that might not have been otherwise attained. He began thus early to realize that what he had to do should be done well and thoroughly, and that there must ever be a prudent regard to all the means for economizing the vital powers, in order to accomplish the highest results. Hence gradually came a more resignedly cheerful view of his condition. For his special friends he had always ready a cheerful and pleasant smile, and a kind greeting. The objects of interest now took an absorbing hold upon him, and he worked as under the eye of the great Task-master, who pays for work rendered, by daily strength to perform, and power

to suffer. With his naturally reticent disposition, especially on subjects out of the domain of science, he gave little expression to his inward feelings, though his serious character showed plainly that he was not indifferent to unseen realities.

In the spring of 1874, a proposed trip to Southern Utah was decided to be injudicious in his frail condition, and was reluctantly but cheerfully given up. Later in the season he accompanied his father to Colorado, spending the late spring and summer months near the foot hills in the vicinity of Boulder. Later, as his strength seemed to justify, he accompanied a family party to his previous camping ground in the mountains near Georgetown.

Here the elevation and doubtless the sad contrast to his previous active condition had a depressing effect, and he was unable to enjoy as he had hoped the wild scenery which he could only survey at a distance. It was afterwards decided to try a winter in Southern Colorado, and by the advice of Dr. Engelmann of St. Louis, who had spent several weeks with the mountain party, Cañon City, at the southern base of Pike's Peak was selected. Here accordingly he spent a solitary, but not unprofitable winter, making short rambles in the vicinity, or in company with the energetic surveyor, T. S. Brandegee, exploring the grand chasms of the Arkansas. His journals and letters during this period show the blending of an earnest desire to accomplish work, tempered by a feeling of physical inability. Eventually we notice the gradual compromise effected by which the actual ability was fully matched by labor performed. During this period of struggle the Davenport Academy of Sciences still held a prominent place in his thoughts and plans. He continued to write encouraging letters, suggested improvements and revolved seriously the subject of publishing Proceedings.

Thus passed the winter succeeding his nineteenth year, in which beside a full record of the weather, there was a deeper record of the fluctuating thoughts of a gifted mind overspread with the clouds of early disappointment.

In the spring of 1875, with somewhat improved health, after a brief visit home, he again accompanied the writer to Central Utah, occupying a pleasant location near the borders of Lake Utah, and in the shadow of Mt. Nebo, with an agreeable Mormon family, B. F. Johnson. Here an interesting variation of scenery and occupation seemed to give promise of permanent improvement, and later in the fall the journey was continued to the Pacific coast, with a view of wintering in Southern California. But in the trying climate of San

Francisco other serious symptoms were developed, and by the advice of physicians he returned home to Davenport to receive the comforts his case seemed to require, and which could not as well be secured in a frontier country. While in San Francisco he formed several pleasant scientific acquaintances with such distinguished entomologists as Mr. H. Edwards, Dr. H. Behr, and R. H. Stretch, with whom he afterwards maintained a mutually profitable correspondence.

On reaching home, then in his twenty-first year, he at once threw himself earnestly into the work to which his future energies were to be largely directed, viz: to the upbuilding of the Academy of Sciences. Henceforth the personal history of our subject is inseparably blended with the institution of which he was at once the support and ornament; not a waking hour in which its interests did not enter into his generous plans and far-reaching thoughts—not however, in any spirit of self-glorification which neither accorded with his natural disposition, or his acquired tastes—he assumed and carried on its most onerous and responsible duties, thus undertaking exhaustive work that he would gladly have transferred to broader shoulders. His true spirit is evidenced in a remark once made to the writer, “If others are unwilling to do what ought to be done, *I must.*”

So as his strength allowed, and often, it is to be feared, beyond his physical ability, he resolutely took up the work that lay before him, inspiring others by his example, and finding his chief happiness in seeing desired results, by whatever means effected, in process of successful accomplishment. It was in this spirit, on his return from the west in November 1875, he introduced at the first regular meeting of the Academy he attended, a series of resolutions as follows:

WHEREAS, The objects of the Academy are the increase and diffusion of a knowledge of the Natural Sciences by the establishment of a Museum, the reading and publication of original papers, and all other suitable means; and,

WHEREAS, Many original investigations have already been made by our members, some of them being of general as well as scientific interest; and,

WHEREAS, The publication of our Proceedings would be advantageous to the Academy, in many particulars, *e. g.*: 1st. It will preserve much material that might otherwise be lost. 2d. It will furnish a greater incentive to our members to make original investigations. 3d. It will increase the Library by means of exchange with other societies and publishers; and, 4th.

It will place us on a creditable footing with the other societies of the world
Therefore be it

Resolved, That the Academy begin the publication of its Proceedings with the least possible delay; and

Resolved, That a committee of five be appointed, of which Messrs. Pratt and Putnam, (ex-secretaries) and Dr. Preston, (present secretary) shall be members, to decide as to the best form of publication, as to title, etc., and to prepare the records and make selections of reports, scientific papers, etc., and determine on the publication or non-publication of each.

Following up the enterprise thus inaugurated, securing such assistance as he could command, (including his ever-present maternal counsellor,) he enlisted the services of the "Women's Centennial Association" to provide the necessary funds. On the very eve of successful attainment, these long cherished hopes were swept away by a disastrous fire, not only consuming the means already procured or in immediate prospect, but involving the publishing fund in serious liabilities. Undeterred by such obstacles, he persevered in his efforts, and the final issue of Volume I was duly announced in August, and in October, before the completion of his twentieth year, its distribution was effected, being sown broadcast over the entire world of science.

Though still burdened by assumed obligations in prosecuting this work, our zealous associate did not wait to see the results which he plainly foresaw from the exchange of publications in enlarging the library, or awakening increased interest in Academy work at home, before urging the necessity of its continuation. Accordingly the printer's ink was hardly dry on the preface of Volume I, when at the annual meeting of January 3d, 1877, Mr. Putnam volunteered to undertake on his own responsibility, the publication of a Second Volume, to be turned over complete to the Academy for its benefit, on the liberal condition that one hundred and fifty subscribers be secured by the members of the Academy within the limits of this local district. With the acceptance of this proposition, notwithstanding a tardy fulfillment of the imposed condition, the work of publication was again taken up with a full appreciation of its difficulties, but with a reasonable expectation of the advantages to be derived from previous experience. Accordingly in spite of the serious hindrance of severe illness, it was carried steadily forward with greatly improved typographical appearance. Part I being issued in July, 1877, while the succeeding Part, delayed by unavoidable hindrances, made its appearance in February, 1880.

The immediate results of the publication thus laboriously car-

ried forward, surpassing even the most sanguine expectations of its advocates, encouraged its enthusiastic editor to continue the work, in spite of the difficulties heretofore realized. Knowing now more than ever before, not only the importance of its continuation, but still more the precarious tenure on which it rested, in his individual support, he bent all his energies to place the publications of the Academy on an enduring basis. It was with this view, in order to reduce the actual expense within the smallest limit, he obtained the consent of the joint owners of the family printing establishment to remove the same to the Academy building, and adding thereto at his own expense, the necessary additional material, he secured all available means for continuing the printing. Thus prepared, as fast as the limited subscriptions afforded the funds for furnishing paper and press work, he proceeded with Part II of Volume III, often setting up the type with his own hands, or when matter was pressing, engaging the temporary services of a regular compositor. It was in this way he clearly showed how the necessary work could be kept up, by his successors, and not till his last feeble grasp was relaxed by death did the busy hand "forget its cunning," the closing pages of Part II of Volume III containing the sad brief record of his finished work.

In the meantime however, other events in the progress of the Academy kept up a lively interest in its ever-constant supporter. On February 22d, 1877, there was formally presented to the Academy, as a distinct recognition of the valuable services of J. Duncan Putnam in its behalf, a valuable building site, the gift of a generous lady, Mrs. P. V. Newcomb. Immediately following this unexpected donation, there was an outflow of public sympathy in the way of subscriptions, and life membership endowments, authorizing the construction of a suitable building as a permanent home. Accordingly a building contract on very favorable terms was concluded September 8th, 1877; the corner-stone was laid with appropriate ceremonies October 4th following, and on February 22d, 1878, just one year from the date of the gift of the lot, the completed building was opened to the public.

That such an interesting event should have excited an absorbing interest in our susceptible friend was to be expected; henceforth the Academy was his second intellectual home, and here scientific work was laid out, and partly completed that would have taxed the highest efforts of a gifted mind. So at last, in a convenient room, surrounded by valuable books, and costly scientific appliances, our

young student set himself down to carry out his boyish wish to "*do something for science*." Here his earliest original investigations on the life history of the maple bark *aphis* (commenced in his seventeenth year,) were carried on and completed for publication, in Volume II. Here he accumulated the material for publishing his monograph on North American *Solpugida*, and here too, a burdensome correspondence as Corresponding Secretary was faithfully conducted, and carefully recorded. But in the meantime financial hindrances came in to divert his attention from strictly scientific work, that in the nature of things never yields substantial pecuniary returns. As the eldest son of a large and expensive family, he felt the necessity of doing something for his own support. With this view, in looking for suitable business, it was suggested that an effort should be made to establish the important office of Iowa State Entomologist, and that our young friend would in such a position find a suitable field for usefulness, and a means of reasonable support. The attempt proved a failure, local jealousies were too strong, and the biennial session of the Iowa State legislature in 1880-1, passed without taking action in this matter. The great and rich agricultural State of Iowa, with its endowed University, its Agricultural College, its Insane Asylums, its Penitentiaries, and its Orphans' Homes, thus missed the opportunity of being also enriched by the labors of one of her native sons. It would now seem to have been not only a wise but a politic course to have secured, when it was available, the organizing capacity of one who would have many times over paid his salary, in giving the results of his researches to the practical farmer and horticulturist, then and now beseeching help to protect the fruit of their labors from the ravages of insect foes. He would have handed down to his successor the true model of a working scientist, and the example of a faithful and honest laborer in the cause of truth. But it was not so to be.

We must needs hasten from these unattractive, but still important details, to fill up the outline of the character and work of this subject of our biographical sketch. Others may take up the more exhaustive summary to be derived from his carefully kept correspondence and journals; my duty as his friend and associate, must conclude by a condensed outline of his prominent personal and mental characteristics, as exhibited in his life and work.

It may and doubtless will be suggested in certain quarters, that the writer of this sketch has left out of view the accessory labors of others in the upbuilding of scientific interests in this vicinity. Such

has certainly been far from his intention. The plain duty before him has been to bring before the public facts in the life history of our subject, illustrating his mental development. This he has endeavored to do conscientiously, plainly, sincerely. If an affectionate interest in his work has led him to overlook for the time his co-workers in this broad field of science, it is because his attention has been necessarily drawn to this one central figure.

In his personal characteristics, Mr. Putnam united in a strange mixture, the simplicity of the child, with the maturity of the man. Thus, while in ordinary business transactions he knew little and cared less for what is known as sharp-dealing, and in the important matter of hygiene was utterly oblivious of the rules of common prudence, no one was more exact in the minutiae of accounts especially relating to scientific operations, or watched with greater care the processes by which life is maintained in the lower orders of insect life. Without showing any marked taste for ordinary mechanical work, he manipulated the special instruments of scientific research with the skill of an artist. Thus after becoming versed in all the practical details of printing, he took up the difficult art of engraving, and transferred with his own hand to steel or copper, the most delicate tracery brought to light under the microscope.

As a writer he was exact, perspicuous, but inclined to be diffuse from the natural tendency of his mind to grasp the whole subject of investigation, and bring out its minutest details. Though not without a keen sense of the ludicrous, or appreciation of the beautiful and grand, he never ventured on the jocular, in his writings, and rarely indulged in any fanciful descriptions. With him the truths of nature were serious matters, and he quickly passed through the imaginative period of youth, to be enraptured and absorbed in the realm of fact. In this ample field he found enough to engage the activities of a short life without wasting his energies in a world of fiction. Naturally reserved and undemonstrative in his social feelings, especially to strangers or those who took little interest in his scientific pursuits, he occasionally unbosomed himself freely to his intimate friends, and was not without genuine outbursts of warm affection towards the objects of his special regard. His scientific attachments were largely with those much older than himself, as might have been expected from his early mental development. Not fluent in ordinary conversation, he preferred to communicate his thoughts through the calmer medium of writing.

His most marked mental characteristic, that on which his scientific

reputation largely depends, and which would in time have secured for him more full recognition as an investigator, was the power of concentrated attention—the same in kind as that to which Newton attributed his greatness. Thus a subject once brought within the range of his mental vision, was at once appropriated, and never lost sight of, till all its details were mastered, all the related facts comprehensively grouped in their proper order, and subjected to the closest scrutiny; not till then were the elaborated results clearly brought to view. It is by just such processes that science is really advanced, and any one capable of such work is a true scientist. But to each human life there is a wise limit affixed, and with our subject this limit was early reached. True, he died young, but

“There are silvered heads
Whose race of duty is less nobly run.”

He had in the previous year (1880) spent some delightful months among his scientific correspondents at the East, delving amid the scientific lore accumulated in vast libraries, laboriously extracting from obscure and hidden volumes what had been recorded by others, and almost forgotten, in the subjects of his special investigation, now carefully noted for future use. Only in the last summer month preceding his decease he was attending a session of the American Association for the Advancement of Science, then convened at Cincinnati. Full of activity and zeal, laying plans for future work, contracting new friendships and winning his way to a larger measure of scientific regard, he returned home, not to resume his scientific work, but to see it day by day slipping from his grasp. The halls of the Academy of Sciences now rarely witness his cheerful face, the Presidential chair is vacant at the regular meetings. Still the interest is kept up, the printing is carefully watched, the daily record is carefully filed away, all is brought up to date. His last feeble enquiry, “How is the Academy? How is the printing?” is satisfactorily answered, and with a look of unutterable weariness, passing over his pale face, his last earnest look directed to the motherly form that had stood by him in all his hours of joy or sorrow, he laid down his *pen*, and took up his *crown*, December 10th, 1881.

Our melancholy duty is also finished; to others must be devolved the task of giving definite form to his unfinished scientific work. We have deposited this poor *chrysalis* in the bosom of all-nurturing earth, the *imago* waits the *fiat* of the Life-Giver.

MEMORIAL PROCEEDINGS OF OTHER SOCIETIES.

The Iowa Academy of Sciences.

REPORT OF COMMITTEE APPOINTED TO PREPARE A MEMORIAL TO THE LATE
JOSEPH DUNCAN PUTNAM.

To the President and Fellows of the Academy:

It is fitting and proper for us, as a scientific association, to record the high appreciation in which we hold the pure life and eminent labors of our esteemed fellow-member, J. Duncan Putnam. His career, measured by some standards, was short; and yet, when measured by the quality and amount of work he has done for science, and the merited honors he has won, it was equal to the longest. He has left us an example of superior talents applied with unflinching and unselfish devotion to the cause of truth; he has left us a name known and honored in the highest scientific circles in all parts of the world. His place in our Academy, and in the wider field of Science, will long be vacant. By his early death the world sustains immeasurable loss.

As a further testimony of our regard for our departed associate, and the honor which we would render to his memory, we lay before you the accompanying memoir.

Respectfully submitted,

S. CALVIN,
W. J. MCGEE.

IOWA CITY, IOWA, May 31st, 1882.

MEMOIR OF J. DUNCAN PUTNAM.

BY W. J. MCGEE.

Though we live in an eminently progressive age, we can hardly claim that the general tendency of our distinctively modern civilization is toward the discovery of the unknown and the elucidation of the mysterious in the economy of the universe. Just as, in the nascent civilization, the development of abstract knowledge was retarded by any environment necessitating constant physical exertion in the effort to sustain individual life and perpetuate tribal organization and existence, so, to-day, the restless activity, the enforced versatility, and the feverish anxiety which appear to be essential to

complete success in the ceaseless struggle in which every breadwinner must engage, are inimical to the slow, cautious, and laborious methods by which alone the bounds of human knowledge may be extended. In our country, and especially in its western portion, there is so strongly pronounced a disposition to ignore all lines of thought and labor save those which tend to immediate pecuniary advantage, that the student of obscure natural phenomena and laws receives more of contempt and suspicion than of encouragement and assistance. There are hence but few here of such energy and independence as to enable them to stem the current of popular feeling, to endure the slights and sneers of unappreciative associates, to rise above the obstacles which they encounter at every step, and to force an unwilling world to acknowledge their worth.

In our own State the original scientific investigators do not exceed a score in number; we can ill afford to spare even the least of these; and when, as in this, our first bereavement, one whose early labors gave so brilliant promise of future usefulness, passes from among us, the blow falls with exceptional severity.

Joseph Duncan Putnam was born in Jacksonville, Illinois, October 18th, 1855. His parents, Charles E. Putnam, and Mary Louisa, *nee* Duncan (daughter of the widely-known Governor Joseph Duncan, of Illinois), both represent notable lines of ancestry which have, both before and since revolutionary days, been distinguished for marked ability and culture, and which have contributed largely to the prestige and renown of the nation. He was thus peculiarly fortunate in birth and early surroundings; for he was not only endowed with a rich heritage of natural gifts, but received every advantage that parental tenderness, coupled with intelligence, culture, and wealth, could bestow. Unfortunately these advantages were offset by his inferior physical constitution, and by the ill health from which he suffered throughout nearly the whole of his life. In early boyhood, indeed, though he exhibited rare capacity for acquiring and assimilating knowledge, he was so constantly ailing that little progress was made in mastering the ordinary rudiments of education until he was ten years of age. Previous to this time, however, he developed a natural taste for drawing, for observing and collecting, and for methodically arranging his small belongings—traits which were characteristic throughout his life; and at eleven years he began a systematic entomological and general collection. From his tenth to his seventeenth years he attended the public schools of Davenport (which city was his home from a few months after birth to the end

of his life), and not only became proficient in all common branches, but, then and by subsequent unaided study, acquired a good knowledge of Greek, Latin, German, French, and some other languages. During the last of these years he mastered (untaught) the art of printing, and, aided only by his younger brothers, published four numbers of a "quarterly magazine devoted to the development of amateur and domestic literature." Throughout this period his interest in natural phenomena, and particularly in the insects, increased, and he made numerous original and valuable observations, a part of which were published, in popular form, in local media. Especially in his seventeenth and eighteenth years (1872 and 1873), during which he accompanied Dr. C. C. Parry to Colorado and Wyoming, his collections and notes added materially to our knowledge of the distribution of certain forms of insect life, and even to the then little known, but much discussed question of insect fertilization of flowering plants. During the latter of these seasons he also carried on a valuable series of meteorological observations in connection with Captain Jones' exploration of northwestern Wyoming. At the close of this season he began preparations for entering Harvard, but his always delicate health became so impaired under the stress of study that he was soon compelled to relinquish this design. The two following summers (of 1874 and 1875) were spent in the western territories; and though he was a constant invalid, and often for weeks apparently at the point of death, he added largely to his collections and notes. In the later years of his life he only did such out-door entomological work as circumstances permitted during brief visits to various localities, either in pursuit of health or in search of the rare and scattered works constituting the literature of the obscure and little-known insect forms, in which he was specially interested; but he was never after able to make extended out-door investigations. It was during these later years, however, that his important studies of the bark lice, and of the peculiar scorpion-like family of spiders (*Solpugida*) were made, that most of his work in connection with the Davenport Academy was accomplished, and that his business labors were carried on.

In June, 1869, Mr. Putnam became a member, in April, 1871, he was made recording secretary, in March, 1876, he was called to the office of corresponding secretary, and in January, 1881, he was elected president, of the Davenport Academy of Natural Sciences. All of his large and valuable collection was placed in the museum of the Academy; and when the publication of the *Proceedings* was

undertaken in 1875, it was at his instance. It was his hands, too, guided by his remarkable literary knowledge and mechanical skill, that collected and arranged the papers and other material for publication, re-wrote much of the manuscript, set up the type, corrected the proof, made the drawings and many of the engravings, and, indeed, performed nearly all of the labor of preparing the volumes which have been issued; and it was mainly his assiduity and business capacity that rendered possible the publication and distribution of these volumes upon the meagre income of the Academy. His duties as corresponding secretary, as well as his original work, brought him into communication with the leading naturalists and scientific societies of this and other countries; and this correspondence forms an intrinsically valuable portion of the archives of the Academy. Moreover, the publication and generous distribution of the *Proceedings* resulted in bringing into the library of the Academy an invaluable collection of standard scientific books, pamphlets, and journals—a library whose cosmopolitan character is attested by the fact that no fewer than twenty-four languages are represented in it. No less was the success of the Academy promoted by the harmony and good feeling engendered by the unfailing courtesy and geniality, the pacific disposition, and the sterling good sense of its leading spirit. Indeed, whatever of success this widely known institution has attained, and whatever of credit it has brought to our State, are mainly due to the untiring industry and the unselfish devotion of its late president.

While either Mr. Putnam's original scientific work or his indefatigable labors in connection with the Davenport Academy would have been remarkable, in view of his constant ill-health, even both do not represent all of the work which he succeeded in accomplishing; since for two years of his life (1879 and 1880) he had charge of much of the business of his father's office. During this period he attended to the correspondence, collecting, and book-keeping of a law office, and in his intervals of leisure assorted, arranged, briefed, and indexed the multitudinous documents which had been accumulating in pigeon-holes, boxes, drawers, and out-of-the-way corners, for twenty years, reducing the chaos to perfect order—either of which duties would have taxed the energies of the strongest and most accomplished business man. His combined labors, indeed, were only rendered possible by ceaseless activity and by the methodical and systematic manner in which all of his work, whether scientific, mechanical, legal, or commercial, was performed. His note-

books, his manuscripts, his letters, his lists and catalogues, and all of his writings, even down to the most trivial records, are models of perspicacity, simplicity, brevity and convenience, and are a revelation to the average naturalist, whose preliminary notes can be deciphered only while fresh, even by himself.

Late in 1881, Mr. Putnam's always precarious health became so much worse than ever before, that all out-door work was rendered impossible; the dread disease, consumption, became complicated with others equally insidious and fatal; the magnificent store of nervous energy ran low; the indomitable will ceased to struggle against the inevitable; and on December 19th, a few hours after completing the revision of the proofs of a forthcoming volume of the *Proceedings* of the Davenport Academy, he breathed his last. Then, more than ever before, his high character and extended reputation as a thorough naturalist, as an upright man, as a steadfast friend, and as a lovable companion, became known. His death spread a gloom over the whole of his own community; the funeral services were attended alike by high and low; the memorial meeting of the Academy was the most impressive ever held in the city; letters of sympathy and condolence poured in from all parts of the land; and appreciative obituary notices appeared in all the leading scientific journals of this and other countries. His twenty-six years were not lived for naught.

Mr. Putnam's scientific publications were not voluminous. Aside from those relating to the bark lice, his most important investigations were never fully elaborated, and were embodied only in notes, letters, and incomplete manuscripts. The following list includes the more valuable of his papers:

1. 1875.—"Report upon the Reconnoissance of Northwestern Wyoming,
* * made in the summer of 1873, by William A. Jones, Cap-
tain of Engineers."—"Entomological Report, by J. D. Putnam."
Pp. 315-8.

This report includes a list of *Coleoptera*, a catalogue of Indian names for insects, and a catalogue of Indian names for colors. The chapter on meteorology (pp. 58-81) is compiled mainly from Mr. Putnam's observations.

2. 1876.—*Proceedings of the Davenport Academy of Natural Sciences*. Vol. I.—"The Maple Bark Louse (*Lecanium acervicola*)." Pp. 37-8.
3. 1876.—*Ibid.*—"Hieroglyphics Observed in Summit Cañon, Utah, and on Little Popoagie River, in Wyoming." Pp. 143-5. Pl. XXVII—XXX.

4. 1876.—*Ibid.*—"Lists of Iowa *Coleoptera* and *Lepidoptera*." Pp. 169-77.
5. 1876.—*Ibid.*—"Lists of Colorado *Coleoptera* and *Lepidoptera*." Pp. 177-87.
6. 1876.—*Ibid.*—"Report on the Insects Collected by Captain Jones' Expedition to Northwestern Wyoming in 1873." Pp. 187-91.
7. 1876.—*Ibid.*—"Indian Names for Insects." P. 192.
8. 1876.—*Ibid.*—"Report on the Insects Collected in the vicinity of Spring Lake Villa, Utah County, Utah, during the summer of 1875." Pp. 193-205.
9. 1876.—*Ibid.*—"List of *Hymenoptera* collected by J. Duncan Putnam, * * * with descriptions of new species. By E. T. Cresson." Pp. 206-11.]
10. 1876.—*Ibid.*—"List of *Orthoptera* collected by J. Duncan Putnam * * during the summers of 1872-5, chiefly in Colorado, Utah and Wyoming Territories. By Cyrus Thomas." Pp. 249-64.]
11. 1876.—*Ibid.*—[Entomological] Notes. Pp. 265-7. Pl. XXXV-XXXVI.

The foregoing papers were separately issued under the title of "Entomological Contributions, from the *Proceedings of the Davenport Academy of Natural Sciences*, Vol. 1."

12. 1877.—*Popular Science Monthly*, Vol. X—"Insects and Flowers in Colorado." Pp. 612-14.
13. 1877.—*Proceedings of the Davenport Academy of Natural Sciences*, Vol. II, Pt. I.—"Horned Toads in the Collection of the Academy." P. 22.
14. 1877.—*Ibid.*—"On the young of a species of *Lycosa*." Pp. 23-4.
15. 1877.—*Ibid.*—"Remarks on *Galeodes pallipes*, Say." Pp. 35-6.
16. 1880.—*Ibid.*—Vol. II, Pt. II.—"Biological and other notes on *Coccidæ*." Pp. 293-347. Pl. XII-XIII.

The last-named paper was also issued separately. The species treated are *Pulvinaria innumerabilis* and *Aspidatus ancyelus*.

17. 1880.—*Transactions of the Iowa Horticultural Society*, Vol. V.—"Rust Producing Mites." P. 365.
18. 1880.—*Proceedings of the American Association*, Vol. XXIX, Boston Meeting. "Notes on North American *Galeodes*." Printed by title only, p. 671.
19. 1881.—*Proceedings of the Iowa Academy of Sciences*, Vol. I, Pt. II. (Not yet printed.) "Observations on *Galeodes*."
20. 1881.—*Proceedings of the American Association*, Vol. XXX, Cincinnati Meeting, (not yet printed.) "Notes on a Bibliography of the *Galeodidæ*."
21. 1881.—*Proceedings of the Davenport Academy of Natural Sciences*, Vol. III, Pt. II, (in press.) "Remarks on the habits of several western *Cicadæ*." Pp. 67-8.

In addition to the foregoing, Mr. Putnam for some time (beginning as early as 1872) edited a scientific column in the *Davenport Western Weekly*, and contributed very many popular articles and letters to several of the Davenport and other newspapers. All of the publications of the Davenport Academy were also edited, and the miscellaneous matter, prefatory and other notes, tables of contents, indexes, etc., prepared by him.

Three important papers were unfinished at the time of Mr. Putnam's death. These are, (1) a brief paper entitled "Notes on the *Solpugidae* of America," which can be published without alteration; (2) an elaborate synoptical bibliography of the *Solpugidae*, which is now undergoing revision at the hands of Miss Julia E. Sanders, of Davenport; and (3) a very imperfect collection of notes of all specimens of *Solpugidae* in the United States, with descriptions and drawings of new species, apparently designed for elaboration into a monograph of the American *Galeodidae*. This material will be arranged and edited by Prof. Herbert Osborn, of the Iowa Agricultural College, and will be published in the memorial volume (Vol. III.) of the Proceedings of the Davenport Academy.

No one can contemplate the results of Duncan Putnam's life work without being impressed with the vast amount of conscientious labor which he performed; and no one can realize the difficulties under which he struggled without a feeling of admiration for the herculean strength of mind and will which sustained him; for the circumstances by which he was environed were not favorable to so great progress. Born with splendid natural gifts, aided and encouraged by the most felicitous domestic relations, and stimulated by the example of a notable ancestry, he was from early childhood an invalid, and for many years a constant sufferer from a painful and depressing disease. His talents at first fostered by the Academy, his only *alma mater*, and by the affectionate solicitude of its leading spirits, he soon so far out-stripped his fellows that on his shoulders alone rested most of the burden and responsibility of the growing institution. His powers of observation at first judiciously developed by precept and example, he early passed beyond his exemplars, and, in the face of the opposition which pioneers always encounter, accomplished more in the few years of his life than do most men who live out their days. His work was his own, and was nobly done. Honor to his memory.

The Cambridge Entomological Club.

The Cambridge Entomological Club, hearing with sincere grief of the death of their late colleague, J. Duncan Putnam, wish to place upon record their appreciation of the high service which he has rendered their favorite science.

The thorough character and conscientious spirit of his work, carried on in spite of bodily disadvantages under which most would have succumbed and sought a life of ease, have won our admiration; and while the value of his investigations is not to be measured by their extent, they have been neither few nor insignificant. A pioneer in difficult studies, he has given solid proof of an independent and well balanced mind, which can ill be spared from the field of his researches. Appreciating, too, the gentleness and manliness of his personal character, which cannot be too highly esteemed, we can only record our deep sense of loss, and offer to his bereaved relatives and friends our heartfelt sympathy, and our acknowledgment of his worth as a scholar and a man.

Attest:

WM. TRELEASE, Sec'y.

The Chicago Academy of Science.

At a regular meeting of the Chicago Academy of Science held at their rooms, December 31st, 1881, the following resolution was passed:

Resolved, That we learn with profound regret the death of Prof J. D. Putnam, President of the Davenport Academy of Sciences, and a corresponding member of this Academy. President Putnam was an earnest and an eminent contributor to the progress of science, whose death we sincerely deplore, and we tender to the Davenport Academy of Sciences our deep sympathy for its loss.

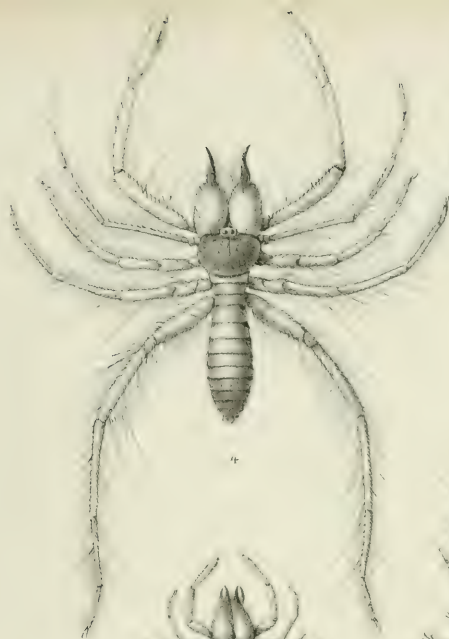
The Secretary was instructed to forward a copy of this resolution to the Davenport Academy of Sciences.

Dr. Andrews and Mr. Blatchford made addresses giving accounts of the services rendered by Prof. Putnam to the cause of science.

[Copy from minutes of meeting.]

C. M. HIGGINSON, Recorder.

[Resolutions of respect were adopted on January 9th, 1882, by the Muscatine Academy of Science: and like action has been taken by several other scientific societies.]



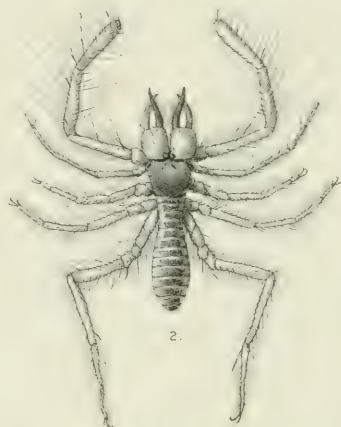
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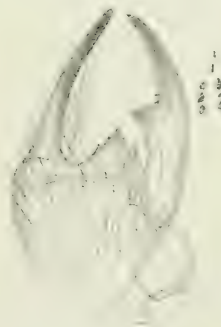
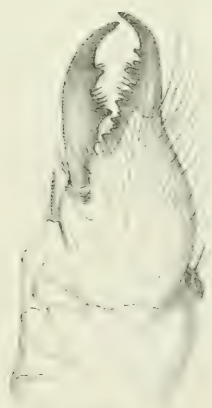
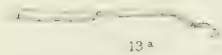
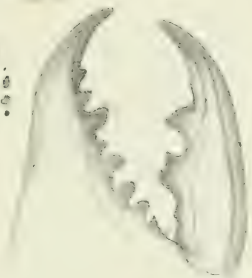
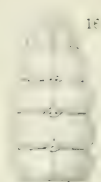
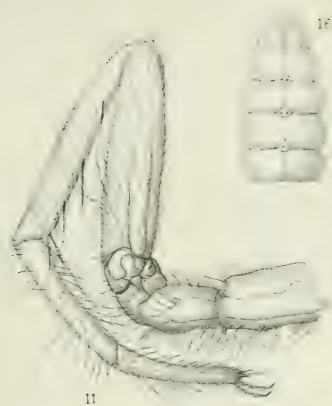
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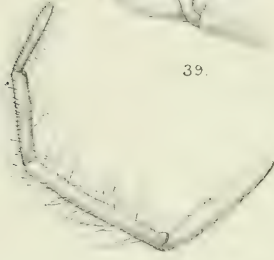






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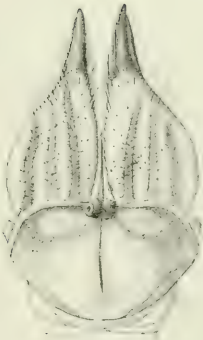
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THE SOLPUGIDÆ OF AMERICA.

PAPERS OF J. DUNCAN PUTNAM.

ARRANGED FOR PUBLICATION BY HERBERT OSBORN, M. SC., ENTOMOLOGIST
TO THE AGRICULTURAL COLLEGE, AMES, IOWA.

PREFATORY NOTE.

It is but justice to my lamented friend, J. Duncan Putnam, whose work on the *Solpugidæ* I have undertaken to prepare for publication, to state that as it now appears, it can by no means represent what he would have made it.

The papers as placed in my hands consisted almost entirely of the original notes, few of which had been even copied, and with the exception of the general matter in the first portion no systematic elaboration had been attempted. Such notes have a connection and a meaning for the person collecting them, which can be but partially apparent to any one else. Had it not been for their remarkable clearness and legibility which left scarcely a word in doubt, the task would have been well nigh impossible.

My attempt has been to arrange all the material in as nearly as possible the order that would have been followed by Mr. Putnam. I have placed,

First. The general notes concerning the family and its genera.

Second. The descriptions of new, and the notes and comparisons of named species.

Third. List of North American specimens giving the collections in which they are preserved.

Fourth. Extracts from notes and correspondence relating to this group.

Fifth. Bibliography, embracing, (1) chronological bibliography; (2) index to species; (3) catalogue of libraries.

The portion embracing general notes is one (apparently the latest) of several which cover nearly the same ground, but exhibit some modifications of statement.

In the descriptions of new species the specific names had unfortunately not been supplied, (with perhaps one exception where a disconnected, partial description, with name, refers to the same insect as another full description), and in order to secure their recognition such names have been added, with Mr. Putnam's name affixed, in the sincere hope that future workers will retain them in the form they are given, and thus secure to the describer the credit which his labor deserves.

The list of specimens and the collections in which they are found will be of great service to future students.

The extracts, which are necessarily few in number, have been selected either with reference to their probable use to those who may study the group hereafter, or to indicate the stages of progress in his own work,

The bibliography to which Mr. Putnam had devoted a great deal of time, has been carried out on the plan indicated in his notes and in the portion already prepared, and the burden of its completion has fallen upon Miss Julia E. Sanders, whose faithful and efficient labor deserves the highest commendation.

The effort has been throughout to give everything word for word as Mr. Putnam left it, and in case of any gap to make no attempt to fill it, considering that any modification would be to mar the work.

Where insertions have seemed absolutely necessary they have been made in broad-faced brackets.

The plates which have been prepared from his original drawings are intended to represent exactly line for line, his work as he left it, though some of the large camera drawings are necessarily reduced in size, and it has of course been necessary to alter the original grouping in some cases in order to arrange them in plates. The fidelity of their reproduction is assured from the fact that the engraving has been under the supervision of Dr. H. A. Hagen, of Harvard University.

HERBERT OSBORN.

DAVENPORT, NOV. 20, 1882.

Notes on the Solpugidæ of America.

BY J. DUNCAN PUTNAM, DAVENPORT, IOWA.

The *Solpugidæ* or *Galeodides* constitute a very distinct group of ARACHNIDA, and may be easily recognized by the elongated, somewhat cylindrical, segmented body, with the head, thorax and abdomen forming separate regions as in insects. The upper surface of the head forms an arched, shield-like plate, bearing two eyes on a prominence at the center of the anterior edge. Projecting from the front are two immense clawed falces, armed in a remarkable manner with teeth, spines, hairs and brushes. Projecting from the head between the falces is the elongated compressed mouth with several appendages, the true nature of which is not at present well understood. The maxillæ are subtriangular in form with an apophysis projecting forward. They each give rise to a large cylindrical palpus furnished, in both sexes, with a soft retractile organ at the end. The first pair of feet (so called) are very slender, without claws, and are used as palpi rather than as feet. Their coxæ are closely united with the maxillæ, and with these and a narrow grooved sternum form the lower surface of the head. The remaining six feet are used for walking and are attached to the three thoracic segments, of which their immovable coxæ form the base. They increase in size posteriorly and are each furnished with two long slender claws, each terminated with a movable nail. On the basal joints of each of the last pair of feet are fine stalked appendages resembling a battledore in

form. The abdomen is composed of ten segments with the genital openings on the under side of the first, and the anus forming a vertical slit on the tenth. There are two spiracles between the first and second thoracic segments, just behind the coxæ of the second feet, and two each on the second, third, and sometimes also on the fourth abdominal segments. The body and limbs are clothed with hairs and spines in great variety, and varying in character among the different genera and species. The particular structure of the various parts, both external and internal, and the functions which they perform is a subject of great interest, but of which I do not at present feel prepared to speak.

Until 1842 these animals were regarded as forming the single genus *Galeodes* or *Solpuga*. In this year C. L. Koch divided the group into five genera based upon the number of joints of the tarsus. This division proved so unsatisfactory that it was not adopted by later authors, as for instance Gervais, and Dufour, who have each treated of the group as consisting of a single genus. In 1879 M. Eugene Simon published a new classification in which he has defined ten genera. To these Dr. Karsch has recently added five, making a total of fifteen genera. Of these five are American, namely: *Datames* Simon, (= *Ghuvia* Koch), *Cleobis* Simon, *Mummucia* Simon, *Zerbina* Karsch, *Daesia* Karsch.

In *Datames* the anterior margin of the cephalic shield is nearly straight, and the fingers of the falces are unlike in the two sexes; the females having both the fixed and movable fingers curved and armed with teeth, while the males have the upper finger nearly straight and unarmed. *D. pallipes* (Say) was first collected in 1820 by Thomas Say, near the base of the Rocky Mountains in Colorado, and may at present be regarded as our most common species, being found also in Kansas, Nevada, and Wyoming. It is about twenty-four mm. long (including jaws), of a pale fawn color, with an interrupted indefinite dark dorsal band, and the metatarsus of the maxillary palpus furnished simply with fine slender hairs, some of them very long. *G. subulata* Say, is but the male of *pallipes*. This species is known to hide under stones and "buffalo chips" in perfect solitude during the day. They are very pugnacious and have been reported by Dr. Gehring to occur in houses in Denver, and to prey upon the bed-bug. *D. sulfurea* Simon, is about the size of *pallipes*, of a grayish color with a dark dorsal band, and has the metatarsus of the maxillary palpus furnished with numerous short conical spines. It has been collected in Texas by Mr. Belfrage, and in Colorado by

Mr. Morrison. *D. Californicus* Simon, is a very pretty species, a little smaller than *pallipes*, more brightly colored and specially distinguished by a series of nine spiny hairs on the internal edge of the metatarsus of each of the fourth feet. It is found in California and Arizona. Mr. Cleveland has found this species near San Diego, under a board, near together in small funnel-shaped sand holes, with nothing else near them in the way of life. They were very belligerent. A large fulvous species with a broad dark dorsal band on the abdomen, received from California and Arizona, appears to be closely allied to, if not identical with, *D. formidabilis* Simon, described from Mexico. It is probable that the specimen collected by Captain Marey, in his Red River expedition, and described by Girard, under the name of *Galeodes subulata* Say, is the male of this species. The specimen is still preserved in the museum of the Academy of Natural Sciences of Philadelphia, and is quite distinct from the *subulata* of Say, which is but the male of *pallipes*.

A species from Mexico is described by M. Simon under the name of *D. geniculata* (C. L. Koch), but it is distinct from the *geniculata* of Koch. Specimens collected by Parry and Palmer, at San Louis Potosi, Mexico, were probably of this species. *D. (Zerbina) gracilis* Koch, from Columbia; *D. praece* Koch, *D. cinerascens* Koch and *Desia formicarius* Koch, from Mexico, referred to *Datames* by M. Simon, are also unknown to me.

In *Cleobis* the anterior margin of the cephalic shield is more or less prolonged or curved, the fingers of the falces are nearly similar in form in both sexes, but in the males the fixed finger is furnished with a slender flagellum. *C. cubæ* Lucas, a very beautiful species, — mm. long, of a grayish color, with two longitudinal dark bands on the back, has been collected in Florida by Dr. Stimpson and Mr. Wurdeman. A species which agrees perfectly with the description and figure of *G. geniculata* Koch, originally described from South America, has been collected by Mr. Belfrage, in Texas. It is of a fawn color with a broad brownish black band on the back. *C. saltatrix* Simon, from Mexico, collected by Dr. Palmer, *C. limbata* Lucas, from Mexico, (one ♂ in collection of Emerton may be this) and *G. morsicans* Gervais, from Chili, included in *Cleobis* by M. Simon, are unknown to me.

The genus *Mummucia* is very similar to *Cleobis*, differing mainly in the arrangement of the teeth on the fingers of the falces. It contains but a single species, *M. variegata* Gervais, from Chili, a small,

very beautiful species marked with alternate black and white longitudinal lines.

In addition to the above, Latrielle has figured a species under the name of *Galeodes spinipalpis* from America, which no other author has since been able to identify. If truly an American species it may possibly be the large species from California and Arizona, which I have confounded with *D. formidabilis* Simon.

Regarding the habits of the American *Solpugidæ* comparatively little is known. I have myself collected but five individuals of *D. pallipes* in different parts of Colorado. They were always found one at a time in a small cavity in the earth under a stone or "buffalo chip". No other animal life was visible in their vicinity, and they appeared to be quite pugnacious. In my haste to transfer them to alcohol I failed to make more particular observations upon their behavior and mode of life. The observations of Professors Snow and Popenoe upon this species agree with my own.

At the meeting of the Academy of Natural Sciences of Philadelphia, held November 7th, 1871, Prof. Cope stated on authority of Dr. Gehrung, that "it [*pallipes*] was common in [Denver] in houses, and was an enemy and destroyer of the *Cimex lectularius* (bed-bug.) In captivity it showed a preference for them as food, and crushed them in its short chelæ preliminary to sucking their juices."

Upon sending me two specimens of *D. Californicus* Mr. D. Cleveland wrote that they were found at San Diego, in October, under a board near together in small funnel-shaped sand holes, with nothing else near them in the way of life, and that they were very belligerent. Rev. E. L. Green writes that one morning at Silver City, New Mexico, he found a small *Galeodes* dead and half buried away on the top of his candle. On another occasion while lying on his bed one very hot night a large *Galeodes* ran across his body and down one of his legs, but escaped before he could capture it. Regarding the Texas species [*D. sulfuria* and *C. geniculata*], Mr. G. W. Belfrage writes as follows: "They are true nocturnal species running with great activity about houses at night, and are attracted by the light, and sometimes to sugared trees. They are rare, but appear more common in rainy seasons, and only in dark and damp nights. They are probably solitary, and although I have examined everything in the locality where they have been taken for many years, I have never found a single one in the day time. When attacked they raise and swing their formidable palpi and show fight, but they are perfectly harmless."

From Guanajuato, Mexico, Dr. Eugene Duges writes as follows: "Here there is a *Glaria* which the vulgar call *Genísaro*, and make out to be excessively venomous, which it is not the least in the world."

Dr. Edward Palmer speaking of the specimens collected by him in Mexico, says: "The *Solpuga* marked San Louis Potosi was running in a garden, the one from Bledos was taken out of my bed at night, while the other was found under a piece of volcanic rock."

Dr. R. A. Phillippi writing from Santiago, Chili, and speaking of the two species described by Gervais (*C. morsicans* and *M. variegata*) says: "They are very common in the streets of Santiago, running with great swiftness in the sun, so that they are called 'arañas del sol,' (spiders of the sun); their bite is said to be very painful, but I know of no personal experience of my friends or my own, unless one case when a young daughter of mine having been bitten in a finger, experienced severe pain, fever, and had the whole fore-arm swollen for two days, but I do not know whether she was bitten by a *Galeodes* or by *Lathrodectes formidabilis*."

The above extracts contain about all that is known regarding the habits of the American *Solpugidae*. There is, however, good reason to infer that like those old world species whose habits are known, they are carnivorous—seizing, crushing and sucking the juice of other animals, not even exempting their own species. Regarding their mode of reproduction little is known; eggs of a peculiar form have been found in the ovaries and the youngest forms observed are not different from the adults.

An excellent resumé of what is known of the habits of the old world species is given by Gervais in "Insectes Aptères," Tomes II, III, and Dufour in his "Hist. Nat. des Galeodes", gives a very interesting chapter on the habits of the Algerian species as reported to him by his correspondents. From this it appears that *Galeodes barbarus* is diurnal in its habits, and that it not only seeks its prey on the level ground but also climbs up plants and shrubs. Its bite is said to be poisonous, causing a severe swelling and twitchings in the limb affected. The Arabs call the *Galeodes* "akreb-errih" or "wind scorpion". Olivier who has traveled in the deserts of Arabia and Mesopotamia, where he encountered many *Galeodes*, says they hide themselves in the day and only sally forth at night.

I have received an interesting letter from Mr. Roland Trimen, of Cape Town, in which he speaks as follows concerning the habits of South African species: "The small striped species runs with im-

mense swiftness over the hot gravelly or sandy soil in the full sunlight, but frequently stops under the stunted vegetation. At Montagna, a village about one hundred miles east of Cape Town, an example of a large sandy yellow species was caught in my presence at night in the parlor of the inn; it was called by the Dutchmen present the 'Jagt-spinnekop', or hunting spider." Mr. Trimen also sends me an account of the habits of a large species observed by Sydney Stent, as follows: "At the Diamond Fields this creature was not uncommon, frequenting dark corners behind skirting, under stones, etc., appearing chiefly at night and running with the greatest speed and activity. As far as noticed the *Galeodes* appeared to live on insects, which it fairly ran down. In confinement it readily attacked and killed good-sized spiders of the genera *Mygale* and *Lygosa*, put under the same glass, and on one occasion even a small lizard succumbed to its bite. A scorpion, however, on being introduced to a *Galeodes* larger than itself soon disabled it. At the Diamond Fields, these 'scorpion spiders' were often found in the houses, where their extreme activity rendered them difficult of capture."

It will be seen that different species differ greatly in their habits.

In addition, the complete life history of not a single species of this most interesting group of animals has ever been traced. I have prepared these crude notes in hopes of calling to them the attention of those who are so situated as to be able to study these animals in their native abodes. In the interest of science I hope my friends will pardon the liberty I have taken in making extracts from their letters.

I am not prepared now to speak of the relations which *Galeodes* bears to other *Arachnids*—but I will call attention to the resemblance it bears to *Thelyphosses* on the one hand, and *Citharius* on the other.

Descriptions of Species.

DATAMES STRIATUS, PUTNAM.

♀ Length 27 to 33 mm. Color fulvous, abdomen paler, with a broad dark brown longitudinal dorsal band, the femur and tibia of the posterior feet inclining to brown near their outer ends, the fingers of the palps reddish brown, becoming black at the tips of the teeth, anterior portion of the cephalic shield reticulated with brown. A slender brownish median line extending backwards from between the eyes, eye prominence black, eyes paler. Cephalic shield about one-half broader than long, with a slight median stria; anterior border nearly straight in front, retreating at the sides to the posterior border, scarcely truncated, clothed with fine, rather long hairs;

eye prominence of medium size, black, furnished with a few spiny hairs of which two in front are longer than the others; eyes large, with the interval between them less than their diameter. Bases of the falces furnished with strong, inequal hairs; fixed finger much shorter than the base, teeth somewhat obtuse and blunt, commencing with two rather small teeth; the first a little larger than the second, a third much larger, the fourth and fifth quite small and situated on the anterior edge of the sixth, which is largest of all; a seventh small, followed by a double row of three teeth each, the anterior of medium size, and the posterior small. The movable finger with two large teeth, the posterior largest, with two small teeth on its anterior border. First ventral segment of the abdomen, with a rather deep and broad canal, broadening out rapidly posteriorly, between two prominent smooth fulvous plates, and containing two stigmata-like openings. Maxillary palpus with a number of spiny hairs on the inside near the extremity of the femur, and also on the inside of the tibia near its base; femur, tibia and metatarsus furnished on the inner margin with numerous fine hairs—a less number outside. Metatarsus and tarsus of about the same length as the tibia, cylindrical or slightly enlarged toward the extremity. Metatarsus of the third feet with two dorsal rows of five spines each, and a row of three spines inside. Metatarsus of second feet with a dorsal line of five and one of three spines, that nearest the base shortest; also four spines on the inner margin. Tibiæ of the second and third feet, with one or more spines near the extremity.

These specimens agree very closely with the description of the female of *D. formidabilis* of Eugene Simon. The main differences are, *formidabilis* is without a median stria, while this has a slight but distinct stria; the posterior border of the cephalic shield largely and obtusely truncated, while in this it is scarcely truncated; the first ventral segment with a light longitudinal canal, while in this the canal is very distinct, deep and broad, differing greatly in form from the figure given (Pl. 3, figure 26 [of Simon?]); the teeth are rather more obtuse than in *formidabilis*; but one row of dorsal spines are mentioned as occurring on the second and third metatarsi of *formidabilis*, while in this there are two rows. Nevertheless, I question very much whether a comparison of these specimens with the types of *formidabilis* would not show them to be identical. The specimen from California is smaller and generally less fully developed than the Arizona specimen, except the genital organs appear to be better developed.

It is probable that the specimen collected by Capt. Marcy in Northwest Texas, in 1853, and described by Girard, under the name of *Galeodes subulata* Say, may be the ♂ of this species. The original specimen is now in the Museum of the Academy of Natural Sciences of Philadelphia, though in bad condition. It is certainly quite

distinct from both *G. subulata* of Say, and the ♂ *D. formidabilis* of Simon. From the latter it differs in the shape and armature of the fingers of the falces, and from the former the differences are much greater.

One ♀ collected by Dr. E. Palmer, at Camp Grant, Arizona, contained in the museum of the Boston Society of Natural History, and one ♀ from California kindly sent me by Mr. James Behrens.

[Until the specimens here described can be more properly referred, they may be designated by the above specific name.—H. O.]

DATAMES GIRARDII, PUTNAM.

♂ Length, twenty-two mm., entire color dark blackish brown, except tarsus and metatarsus of feet are paler, abdomen above shows traces of a broad dorsal band.

Head, six mm. broad, four mm. long, anterior border nearly straight, slightly convex, retreating rapidly at the sides; posterior border, broadly obtusely truncated, posterial sides retreating posteriorly; hairs short, fine, sparse; eye prominence, only moderately elongated and projected; eyes brown with black pupil, their interval greater than their diameter; hairs irregular [broken off.]

Mandibles: base three mm. upper finger four mm. long; base only moderately convex, suddenly contracted at the upper finger; furnished with numerous stiff spines, finer hairs intermingled; upper finger one-third longer than the base; subulate, nearly straight, directed downwards, and slightly outwards, unarmed beneath, an elevated obtusely pointed knob above, near the base; furnished inside with a brush of stiff brown hairs directed forwards. No flagellum.

The (fond) of the jaw approximately vertical, prolonged anteriorly at the teeth; armed with two rows of three teeth each; the outer row with upper tooth largest, second next, third smallest, inner row small, of nearly equal size; a cavity formed between the two rows of teeth into which the large tooth of the lower finger fits.

Lower finger with a large conical tooth near its base; concave inward, convex outward, at its base an elongated conical small tooth projecting forwards, followed after an interval by a minute denticle, and then by two obtusely rounded elevations, a short distance beyond which the finger is distinctly constricted; usual brush of hairs inside; carina on outside extending to point.

Maxillary palpus: femur seven mm., tibia eight mm., metatarsus six mm., tarsus two mm.; tibia fusiform, tibia and tarsus enlarged toward the extremity; femur, tibia and tarsus with very fine, rather long hairs, some of them almost spiny; also numerous shorter, fine, pale colored hairs; tibia and metatarsus furnished in addition with very numerous short, stiff brown conical spines or very stiff hairs, some of them truncated.

Fourth legs: femur, eight mm., tibia eight mm., metatarsus five and a half mm., tarsus four mm., claws 1.3 mm., femur with fine hairs, no spines, tibia with fine hairs, some long, and several spines toward the extremity, that at the end being largest and longest; metatarsus with fine irregular hairs; nine spiny hairs at regular intervals below, not reaching to the extremity; several other irregular spines; tarsus hairy and with a number of spines below.

Third legs: tibia five and a half mm. with spines on outer extremity; metatarsus five mm., with two rows of dorsal spines, six outside, four inside; one row of three ventral spines; hairs as usual fine and unequal; tarsus two mm. long with usual brush of hairs beneath. Abdomen oval, rounded, slightly hairy; genital opening a longitudinal slit in a slight elevation. A pair of spiracular openings on the posterior portion of each of the second and third segments, none on the fourth.

One ♂ Museum Acad. Nat. Sci., Phila. Ark., Capt. Marcy. [Description written October 22, 1880.]

[A disconnected slip in Mr. Putnam's papers contains the above specific name, and if the species proves distinct it may properly be retained.—H. O.]

DATAMES CONSTRICTA, PUTNAM.

♂ Length, twenty mm.; colors, top of head and base of mandibles reddish ochre yellow, limbs same color, but paler, becoming still lighter at the extremities. Abdomen above, dark olive brown, posterior border of each segment grayish; also gray specks all over; jaws of mandibles dark red, changing to black at the points; under side of abdomen like upper, but more yellowish, especially towards the posterior; eye prominence, and front border of head black; tips of claws brown; eyes gray; mandibles with stout spiny bristles; a brush of long hairs inside of the upper fingers; contracted very suddenly at the fingers, which are slender and spine-like.

Head seven mm. wide, five mm. long, without median stria; hairs irregular, mostly fine, but some of them spiny, especially at the sides and in front; eye prominence, moderately large, projecting over the margin where it is prolonged into an acute point furnished with a number of hairs, two of which on the front are larger than the others; eyes rather large, their interval greater than their diameter; mandibles, base three and a half mm.; upper finger five mm. long; base only moderately convex, suddenly constricted at the upper finger, furnished with numerous spines and spiny hairs, and a few fine hairs; upper finger subulate, slightly arched, directed obliquely downward and slightly outward, unarmed; furnished on the inside with the usual brush of stiff hairs directed forwards; no flagellum. ("Fond") of the jaw prolonged anteriorly into a conical projection supporting the teeth. Teeth commencing above with two minute teeth on the median line, then dividing into two series with a cavity between; the outer row consists of four teeth of which the first (uppermost) is largest and projects farthest to the front. The second is very small, the third is a little smaller than the first, and the fourth is about the same size as the second. The inner row consists of three good sized teeth, the first largest, third next, second next. Lower finger regularly curved without constriction; a large tooth near the base concave behind con-

vex in front; a small tooth near its base projecting forwards; a carina outside extending towards the point; a rather heavy brush of feathered hairs inside. Maxillary palpus: femur eight mm.; tibia eight and a half mm.; metatarsus six mm.; tarsus two mm.; femur with a number of large spines on the inside, especially on the ultimate third; tibia with very few spines, but a good many fine hairs, mostly short, some very long, irregular. Metatarsus, with some fine spines near the base inside, fine hairs elsewhere, mostly short, some long, on the inside a cluster of oval or round scales or pustules, beginning two mm. from the base, and extending not quite to the tip; tarsus with numerous fine, short hairs, some of them long.

Fourth legs: femur, nine mm.; tibia eight and a half mm.; metatarsus five and a half mm.; tarsus four mm.; claws 1.8 mm.; femur with fine hairs, no spine, one or two hairs on the back, long and stout; tibia with fine hairs, two spines inside, near the extremity; metatarsus with a row of nine spines on the lower inside; a row of three spines on the lower outside, besides numerous fine hairs; tarsus with a row of five spines outside and three inside, besides the usual terminal spines, and fine hairs. Claws, hairs, etc., as usual in the genus *Datames*; abdomen oval, elongated, comparatively small, ordinary form of ♂ genital opening underside of first segment; not as large or well developed as usually seen; spiracles of usual form on second and third segments.

One ♂ Museum Acad. Nat. Sci., Phila. No locality. [Description written October 22, 1880.]

DATAMES DILATA, PUTNAM.

♀ Length twenty-five mm.; color, abdomen and thorax, dark slate color, variegated; gray ground, blackish speck; head, dark reddish brown; a light yellow spot immediately behind the eye prominence; appendages all of uniform reddish ochre yellow; fingers of mandibles reddish brown, with black points, and teeth blunt.

Lengths, maxillary palpus, twenty-three mm.; labial palpus, eighteen mm.; first legs eighteen mm.; second legs twenty-two mm.; third legs thirty mm.; jaw tip to anus, thirty-three mm.; eyes to anus, twenty-five mm.; terminal joint of palpus continuous; tarsus apparently one jointed; head, seven mm. broad; five mm. long, with faintest possible trace of median stria; anterior border straight, oblique at angles, rounded at sides; broadly truncated behind; hairs very sparse, fine and short; eye prominence of medium size, slightly elevated, and slightly projecting, black in front and at the sides, pale behind, a few fine unequal hairs; eyes bluish, their interval greater than their diameter. Mandible, nine mm. long; base five and half mm. long; strongly convex; swollen at their base; furnished with fine spiny hairs; rather sparse and unequal; three obscure dorsal longitudinal bands on the base of each; teeth obtuse, two of medium size, followed by one, rather large one, then a very small denticle, then the largest tooth of all, then two minute denticles; teeth then divide into two series, the outer with three teeth—the last smallest; the inner series with four teeth, the first largest, the third next, and the second and fourth, very small; the lower finger is a little shorter

than the upper, and has two large teeth; the interior being largest, and with a small denticle on its anterior margin; the lower finger with a distinct lateral carina extending nearly to the point; brushes to the fingers as in the other ♀ *Datames*. Maxillary palpus; femur with a number of spiny hairs on the inside, especially on the ultimate portion; tibia and metatarsus also with a few irregular spiny hairs on the inside; more slender than those on the femur; thickly clothed, especially on outside, with fine, short hairs, with a few very long ones intermingled; length, femur, six mm.; tibia six and a half mm.; metatarsus, five mm.; tarsus, one and a half mm., each enlarged from base to extremity; metatarsus, and tarsus closely and rigidly united, but separation distinct; tarsus with numerous fine hairs. First legs slender, with fine hairs, without spines, without claws. Second legs, metatarsus, with six spines one side, four the other; tibia with two spines near the end, several weaker ones toward the base. Third legs, metatarsus with five pairs dorsal spines; three ventral spines; tibia, with few weak spines. Fourth legs, metatarsus, with row of about nine spiny hairs on underside, besides the three regular spines; no spines on back; tarsus long, single joint with about four pairs of spines beneath; all the legs furnished with numerous fine hairs, some of them very long; tibiae I, II, III, with terminal spine. Head and abdomen almost without hairs; first sub-abdominal segment with sub-triangular plate divided into two lobes by a longitudinal depression, which enlarges at about the ultimate two-thirds into a sublunar cavity, and this again after a slight contraction into a larger semi-circular cavity. Semi-circular depressions on posterior margins of second and third segments each with two spiracular openings.

One ♀ Museum Acad. Nat. Sci., Phila. Locality unknown. [Description written October 23, 1880.]

DATAMES CINEREA, PUTNAM.

Agrees with Simon's description of *Datames*, except as follows: The fixed finger is not quite as long as the "tigit". The front tooth much more distant from the next than in any other species. Metatarsus of fourth pair with six strong spines. They differ quite perceptibly from all other *Datames* known to me, in being much more hairy.

♂ Length 26—27 mm.; color, pale reddish yellowish white; darker and more reddish on the head and mandibles, feet paler; fingers of mandibles, chestnut brown, becoming very dark at the points; abdomen showing traces of a grayish dorsal band. Cephalic shield a little broader than long, without median striae; its anterior border slightly convex; its sides retreating towards the rear; posterior border rounded, scarcely at all truncated; very hairy; hairs slender, long and pale colored. Eye prominence of medium size, elevated and projecting over the front; furnished with numerous slender, irregular, pale colored hairs more abundant in front; scarcely darker

than the surrounding parts; eyes large, pale colored with black pupils, their interval greater than their diameter.

Base of the mandibles above about as long as the head; moderately broad; not very convex at the sides, furnished with numerous, rather stiff subulnt spines; less abundant at the base of the top than elsewhere, and longer near the base of the fingers; fixed finger about three-fourths the length of the base, rather straight, subulate; directed obliquely downwards, and slightly outwards, with a shallow concavity about the middle of the lower and inner side; smooth, not carinated, unarmed; furnished on the inside with a brush of strong white subulate spines directed forwards; no flagellum. At the base with a deep canal armed with four acute teeth on each side, the second and fourth, small; the first (upper one) largest; the third next. Traces of still smaller teeth may be seen. Movable finger with a moderately large acute conical tooth near the base followed at a short distance by two denticles; the anterior smallest; then follows a sharp carina, straight on top, then another carina terminating in a forward projecting tooth; finger carinated outside and furnished with a row of fine points, terminating at the anterior tooth.

Maxillary palpus, moderately robust; furnished with a number of subulate spiny hairs, with numerous fine slender hairs, rather long and inequal. Tibia, thirteen mm.; femur, thirteen mm.; tarsus, eleven mm., (no separation between tarsus and metatarsus visible), all joints not quite parallel. Underside of metatarsus IV, with about ten spiny hairs, besides two other spines not in the row; metatarsus, eight mm.; tarsus five mm., long and slender; tibia twelve mm.; femur, thirteen mm.; coxæ, thirteen mm.; all with a few spiny hairs on underside, and more numerous, long slender hairs. Metatarsus III, with six pairs of dorsal spines; three ventral spines; fine hairs between, etc.

Abdomen, oval (much shrunken in these specimens). Genital opening a longitudinal slit between two rounded elevations without hairs; the rest of abdomen covered with fine pale hairs; a pair of spiracles on second and third segments.

Two ♂, in Museum Acad. Nat. Sci., Phila. Locality unknown. [Description written Oct. 22, 1880.]


[The above specific name occurs with an incomplete MSS. description of much earlier date than the one given here.—H. O.]

STIMPSON SPECIMEN.

Length 22 mm.; abdomen eleven and a half mm.; thorax, two mm.; head, three and a half mm.; jaws, five mm.; breadth, abdomen, five mm.; thorax, two and a half mm.; head, four and a half mm.

Cephalic shield, with the front margin regularly rounded; lateral corner projections moderately prominent; lateral posterior margin regularly curved and continuous. Shield one-fourth wider than long, the eyes projecting very little over the front; flatly arched; finely and sparsely haired, hairs longest on front margin; several spines in front of the eyes extending for-

ward, two of which are more prominent; fawn color; a narrow distinct dark line extending directly backward from between the eyes; a dark space behind on either side, the lateral corner projections lighter.

Mandibles, length, six mm.; project five mm. beyond the eyes; height, two mm.; elongated, very little enlarged at the base, which presents an oval section; gradually prolonged to form the upper finger of the jaw; the movable finger is less than half the length of the mandible; the points and teeth are rather blunt; armed with four rounded blunt teeth as in figure. Immoveable finger; armed with four primary teeth, --- and eight secondary teeth arranged in two rows, the inner having three and the outer five teeth (the last inner one and the last two outer teeth being mere points) arranged thus: ; covered with fine bristles; longer and more abundant above and toward the front on outside; a brush of rather long pinnated bristles on the inner side of the upper finger; a similar brush of longer more curved, less numerous feathered bristles on the inside of the movable finger. Both fingers otherwise glabrous, reddish, becoming black at the points and teeth. Mandibles obscure, slightly reddish yellow; bristles more reddish; eye eminence black, slightly elevated; eyes dark blue, round. Mandibles two-joints, first joint sub-cylindrical, gradually narrowing toward the point and forming a regularly curved finger, armed with blunt teeth; second joint forming the movable finger, inserted a little more than half way from the base of first joint, and just reaching the end of the upper finger, and when closed crosses the upper finger internally; lower finger narrow, regularly curved vertically, but laterally first curved out, then in, then out, and then in again.

Maxillæ: first joint immovable, elongated, triangular; separated from each other by a sunken grooved sternum which extends behind and around the bases of the labial palpi, where it forms a triangular piece (labia?) with a very narrow apophysis forming a prolongation of the inner edge. The apophysis and inner edge are furnished with rather long bristly hairs of reddish color; second joint short, triangular; third (femur) joint longest; fourth (tibia), fifth (metatarsus) and sixth (tarsus) respectively smaller; the third and fourth are largest beyond the center, and are furnished on the inside with fine hairs of variable length; shorter hairs on outside; color light reddish yellow; fifth and sixth joints cylindrical and closely united; furnished all around with hairs of variable lengths; on the inside with two rows of short bristles; color of five and six dark brown; at the end of the sixth joint is a semi-lunar orifice closed by a double curved lip, through which is protruded at times a grayish soft mushroom shaped appendage. The first joint of the labial palpus is sub-cylindrical, nearly as long as the maxilla to which it is closely attached. Second joint short, cylindrical; third joint scarcely longer, somewhat triangular; fourth joint, equals first three, but more slender; fifth still more slender and longest; sixth and seventh joints respectively shorter and thinner. As a whole these palpi are very slender, short, pale yellowish, well furnished throughout with fine hairs of variable length, some quite long. Situated in continuation of the sternum, and between the mandibles below, is a complex lingua variously furnished with hairs, membranes, lips, etc.,

and with two comparatively long feathered hairs on either side of the projecting point.

Thorax, very small and weak; above, the first segment is closely attached to the head while the other two appear continuous with the abdomen, but with a much less diameter. Beneath, the thorax appears composed of the basal plates of the three pairs of legs, which plates are immovable and are separated by a very narrow depressed sternum. The bases of the first are more closely united to that of the labial sternum, and are separated from those of the second pair by quite a wide and deep groove in which is a pair of stigmata. The second and third pairs are closer together. The second pair are trapezoidal in shape, having the front edge very nearly at right angles with the median line, while the posterior edge extends obliquely backwards. The third pair of sternal plates fits closely into the angle thus formed—and between the two sides is quite a large triangular space—closely connected with the genital plate on the first joint of the abdomen.

Legs: The first pair of legs stout and short, the first joint fixed (as above) broader than long; second joint sub-triangular, short, bending upwards; third joint also short sub-triangular, and bending upwards; fourth joint (—femur), about as long and nearly as stout as the second and third, and bends upwards; fifth joint, (tibia) longer and weaker, and bends downward; sixth joint (metatarsus) shorter and weaker than tibia, bends downward; seventh joint (tarsus), one-third as long as metatarsus, with universal motion, terminated by a small heel joint and cushion, and two large movable claws; each claw being terminated by a sharp movable (!) nail of darker color. All the joints covered with very fine slender hairs, some of those on the metatarsus and tarsus being much longer than others, and these two joints are further furnished with a few stiff spines on the lower outer side directed outwards. This pair of legs as a whole is directed slightly forwards. The second pair of legs are very much like the first, but longer and stouter, with rather longer hairs, etc.

The third pair of legs are much the longest and stoutest, but, are not quite as stout as the first pair of palpi. They are as long as the entire body from eyes to anus. The first (fixed) joint bears two leaf-like appendages. The second joint two, and the third joint one of these appendages. The second, third and fourth joints are short, stout, and have but little independent motion, and what there is, is upwards. The rest of the joints correspond closely in their characters with the other legs, except in size. The basal joints all present a more or less triangular outline. The femur and tibia are slightly swollen, while the metatarsus and tarsus are nearly cylindrical. The tarsus of the third pair of legs is two-jointed and moderately long.

The abdomen is composed of ten joints of nearly equal size. The first joint is longest and narrowest, and bears on the lower side the genital plates. The genital plates are triangular in shape, covered with fine hairs. The vulva is a long, narrow slit between the plates, enlarging trumpet-like at the posterior end, composed of fleshy lips free of hairs; segments becoming

gradually larger to the fifth, which is largest and then becoming gradually smaller to the last (tenth) which is smallest. The second and third segments each have on the under side a pair of narrow slits close to the median line. (=stigmata probably).

The abdomen is quite regularly oval in shape, very slightly depressed, of a general ashy color, with a yellowish tinge; two rows of dark brown subquadrate spots form two stripes along the dorsal surface, commencing on the second thoracic segment and extending separately to the eighth segment. On the ninth and tenth segments the two spots are united into one. These dark stripes are also faintly visible on the underside of the last three segments. On the underside is a median and two lateral faintly depressed lines. The abdomen is clothed very sparsely with very fine hairs: hairs are more numerous on the dark spots above; anus, a vertical slit, closed by two smooth lips on tenth segment.

Colors: cephalic shield, mandibles, maxillae, labia and first two movable joints of maxillary palpi and labial palpi, basal and coxal and trochanteral joints of all the legs and base of femur, ochre yellow, fawn color, flesh color. The abdomen yellowish, ashen gray, lighter below. The terminal portion of the femora, the whole of the tibiae, all of the metatarsi, except the tips, the third, fourth and fifth movable joints of the maxillary and labial palpi, and the two stripes on the abdomen, deep, dark brown; the labial palpi being rather lighter; the tarsi rather paler in color; the jaws reddish, passing into black at the tips and the teeth.

Eyes round, gray, encircled with black; labial palpi very weak and slender. Maxillary palpi very stout. Lingua as in figure.

This description is mostly made up from the specimen collected by Dr. Wm. Stimpson. The specimen collected by Mr. Wurdeman, is in better condition; the abdomen larger, (full of eggs?) brighter and deeper colored throughout. It was evidently in a state of excitement when captured. The fleshy organ at the end of the right maxillary palpus is extruded, while that on the left is withdrawn. The right labial palpus has been caught in the jaws. In the Wurdeman specimen the outer tooth of the lower jaw is a little sharper than in Stimpson's, otherwise the dentition is alike.

Two specimens belonging to Museum of Comparative Zoology, kindly loaned by Dr. H. A. Hagen, (March, 1877 to July, 1878). These notes written and drawings made in July, 1878.) (*Galeodes* [*Cleobis*] *Stimpsoni*, Putnam.

POINTS OF DIFFERENCE.

Urbæ Lucas-Simon.

♀ Long 16 mm.

Head and cheliceres, 'faune rou-geatre.'

Abdomen, 'testace mat.'

Pattes I, II, III 'testace clair.'

Pattes IV, brun rouge; metatarsus, presenting two lateral series of 4-4 robust spines, very short, dentiform, 'pas de crins tronque'.

Eye prominence not canalicu-lated; maxillary tibia, longer than femur.

Limbata Lucas-Simon.

♂ Long 15 mm.

♀ Long 17 mm.

Head 'faune brunatre', darker in front; thorax and abdomen 'faune testace', with two large long, black bands.

Tibia of maxillary palpi, a little longer than the femur.

Metatarsus maxillary palpus, with two lateral rows of 5-6 robust spines, rather short.

Specimens in M. C. Z.—*J. D. P's*.
Notes.

♀ 17 mm.

Head fawn color.

Abdomen of a general ashycolor, with yellowish tinge. The differ-ences in color are no greater than is to be expected. 3 and 6 joints maxillary palpus, furnished on the inside with two rows of short bristles.

In all other points Simon's des-cription applies quite perfectly. Maxillary tibia shorter than femur.

Same as above.

♂ None.

♀ Long 17 mm.

Head, fawn color, darker behind the eyes.

Thorax and abdomen ash color.

Fourth joint a little shorter than the third.

Two rows of bristles.

September 11, 1880, Entomological Department, M. C. Z. Comparing the specimens directly with Simon's description reveals only the following differences:

The first, second and third legs are of a darker color in the portions which are brown in the fourth pair. The Wurdeman specimen is a little larger. The spines on the metatarsus of palpus are some of them a little longer than might be called dentiform. Compared with the Lucas figure in Guerin's "*Mag. de Zool.*", the colors are more nearly as described by Simon, than as shown in the figure; the dorsal bands are darker and more distinct, the cephalic shield, mandibles, palpi and feet are all larger and proportionately longer than represented.

Compared with the description, the palpi though robust are not so short as might be inferred, and they are composed of five joints.

The hairs on the palpi are rather lighter colored, not brown. The mandibles are not particularly short or compressed. The abdomen is not yellow; two brown marks on each segment instead of "un point rougeatre." The first pair of feet are scarcely "entirely blond."

[The above description, name, and comparisons are given *verbatim* from Mr. Putnam's notes, though in another place it will be seen that he seems to have referred the specimens to *Cleobis cubæ* H. Lucas.—H. O.]

[DATAMES CALIFORNICUS, Simon.]

[Specimen in M. C. Z.], San Diego, California, 1272.

Differs from the specimens received from D. Cleveland in being smaller, rather more slender, with the bases of the mandibles proportionately more swollen, the three brown lines more prominent. The colors of the rest of the body generally paler. This is apparently an immature specimen. (March 14, 1879.)

Colors: Head and mandibles yellowish reddish brown, marked with darker brown, substantially as shown in the drawing; teeth and ends of the mandibles merging into black at the tips.

Thorax and abdomen pale yellowish, with a broad dark brown dorsal band, the latter considerably speckled with luteous spots and points; the brown mark on the first two thoracic segments. The shape of these two brown marks is different from the remainder which are nearly quadrate. The brown spot on the first thoracic segment has three yellow spots, and that on the second has two.

Legs pale, femora and tibiae darker, tarsi paler, labial palpi very pale; maxillary palpi pale at base, at the end of the third and whole of the fourth joint darker; the fifth and sixth joints closely connected and dark.

* * * Agrees very perfectly with Simon's description, except it is a little larger, and the metatarsus and tarsus of the maxillary palpus is a little shorter than the tibia instead of longer.

List of American Solpugidæ,

WITH COLLECTIONS IN WHICH SPECIMENS ARE PRESERVED.

1. DATAMES FORMIDABILIS, Simon.

Collection, J. D. Putnam: 1 ♀ from Hy. Edwards, Arizona, (dry).

1 ♀ from James Behrens, California, (alcohol).

1 ♂, Mexico, from Dr. E. Foreman.

Collection, Boston Society Natural History: 1 ♀ collected by E. Palmer. Camp Grant, Arizona.

- Collection, E. Simon Paris: 1 ♂ Guanajuata, Mexico. 1 Types.
 Collection, Musée de Bruxelles: 1 ♀ Guanajuata, Mexico.)
 Collection, Geo. Marx: 1 ♀. No locality.
 Collection, Hy. Edwards: 1 ♀, Arizona.
 5 specimens in U. S.; 2 in Europe.
2. *DATAMES* ——— (= *D. GENICULATUS*, Simon not Koch).
 Collection, E. Simon: 1 ♀, Mexico. (Type.)
 Collection, J. D. Putnam: (?) 3 ♂ 3 ♀, San Louis Potosi, Mexico.
 From Dr. C. C. Parry and Dr. E. Palmer.
 6 specimens in U. S., 1 in Europe.
3. *DATAMES PALLIPES*, (Say) (♂ = *GALEODES SUBULATA*, Say).
 Say's types destroyed. ? ! ? (Ought to be in Philadelphia, but are not.)
 Collection, J. D. Putnam: 1 ♀, Denver, Col.; 2 ♀ Valmont, Col.
 2 ♀, Canon City, Col. 1 ♂, 1 ♀ Colorado Springs. (Snow.)
 1 ♂, Wyoming, Capt. Burt, (McCook).
 1 ♀, Ellis Co., Kansas, (Popenoe).
 Collection, S. H. Scudder, (?) 1 young ♀, Lakin, Kansas.
 Collection, Dr. Cyrus Thomas, 1 ♀
 Collection, Oberlin College, Ohio, 1 ♂.
 Collection, E. Simon, ♂, ♀ Colorado, Utah, Nevada, (Collected by Morrison) 1 ♂, 1 ♀, Colorado Springs, Col. (Collected by Snow, sent by J. D. Putnam.)
 Collection, Geo. Marx: 1 ♂, New Mexico and Arizona.
 13 specimens in United States, 4 in Europe.
4. *DATAMES SULFUREUS*, Simon.
 Collection, E. Simon: ♀, Colorado, (Morrison) (?). (Type.)
 Collection, Peabody Acad. Sci., Salem: 1 ♀, Texas, Belfrage.
 Collection, J. D. Putnam: 2 ♂, 2 ♀, Texas. (Belfrage), 1 ♀, Laredo, Texas, (Palmer).
 Collection, Geo. Marx: 2 ♂, Georgia.
 8 specimens in United States, 1 in Europe.
5. *DATAMES CALIFORNICUS*, Simon.
 Collection, E. Simon: 1 ♀, Mariposa, California. (J. Thevenet). (Type.)
 Collection, Mus. Comp. Zoology, Cambridge, Mass.: 1 ♀, San Diego.
 Collection, Bost. Soc. Nat. Hist.: 1 ♀ Camp Grant, Arizona, (Palmer).
 Collection, J. D. Putnam: 1 ♀ Sierra Valley, Cal. (Henry Edwards), 2 ♀, San Diego, Cal., (D. Cleveland).
 Collection, Hy. Edwards: 3 ♀, California, 1 ♀, Arizona.
 9 specimens in United States, 1 in Europe.
6. *DATAMES* ——— (= *GALEODES SUBULATA*, Girard, not Say).
 Collection, Acad. Nat. Sci., Phila.: 1 ♂, Red River, N. W. Texas, (Capt. Marcy). (Type.)
 Collection, Geo. Marx: 2 ♀, 3 ♂, Arizona and New Mexico.
 6 specimens United States.

7. *GLUVIA FORMICARIA*, C. L. Koch.
Collection, Berlin Museum: ♀, Mexico. (Type.)
1 specimen, Europe.
8. *GLUVIA CINERASCENS*, C. L. Koch.
Collection, Berlin Museum: ♂, Mexico. (Type.)
1 specimen Europe.
9. *GLUVIA ELONGATA*, C. L. Koch.
Collection, Berlin Museum: ♂, Mexico. (Type.)
Collection, Geo. Marx: 1 ♂, Texas.
1 specimen United States, 1 in Europe.
10. *ZERBINA (GLUVIA) GRACILIS*, C. L. Koch.
Collection, Berlin Museum: ♀, Columbia. (Type.)
Collection, British Museum: Mexico.
2 specimens, Europe.
11. *DÆSIA (GLUVIA) PRÆCOX*, C. L. Koch.
Collection, Berlin Museum: ♂, Mexico. (Type.)
1 + specimen in Europe.
12. *CLEOBIS SALTATRIX*, E. Simon.
Collection, E. Simon: ♂, ♀, Mexico. (Types.)
 2 { Collection, J. D. Putnam: 1 ♂, Blados, Mexico, (Palmer).
 { Collection, J. H. Emerton: 1 ♂, Costa Rica.
 2 specimens United States, 2 in Europe.
13. *CLEOBIS LIMBATA*, (H. Lucas).
Collection, Paris Museum: 2 ♂, Mexico; 1 ♀, Guatamala, (M. Augrand).
(Types).
Collection, British Museum: Jamaica.
Collection, J. H. Emerton: 1 ♂, Yucatan. (May be male of *C. cubæ*).
(Probably not).
1 (?) specimen United States, 4 in Europe.
14. *CLEOBIS CUBÆ*, (H. Lucas).
Collection, Paris Museum: 1 ♀, Cuba. (Type.)
Collection, Mus. Comp. Zool., Cambridge, Mass.: 1 ♀, Key West, Florida, (W. Stimpson); 1 ♀, Florida, (Mr. Wurdeman).
Collection, Geo. Marx: 1 ♀, Florida.
3 specimens United States, 1 in Europe.
15. *CLEOBIS GENICULATA*, C. L. Koch.
Collection, Berlin Museum: 4 ♀, vicinity of the Orinoco. (Types.)
Collection, British Museum: Jamaica.
Collection, J. D. Putnam: 2 ♀, 7 ♂, Clifton, Texas, (Belfrage).
9 specimens in United States, 5 in Europe.

16. *GALEODES GRYLLIPES*, P. Gervais.
Collection, Gervais: (?) Martinique.
Collection, British Museum: (?) (Type.)
1 + specimen in Europe.
17. *GALEODES MORSICANS*, P. Gervais.
Collection, Gervais: (?) Chili. (Type.)
1 + specimen in Europe.
18. *MUMMUCIA VARIEGATA*, (P. Gervais).
Collection, Gervais: (?) Chili. (Type.)
Collection, Paris Museum: 1 ♀, Peru.
Collection, J. D. Putnam: 50 + ♀, Santiago, Chili, (Dr. Philippi).
50 + specimens in United States, 2 in Europe.
19. *GALEODES SPINIPALPIS*, Latrielle.
Collection, ——— ♀, America. (Type where is it?)
0 specimen known.
20. *DATAMES* ——— ? (Near 6.)
Collection, Acad. Nat. Sci., Phila.: 1 ♂. Locality unknown.
1 specimen in United States.
21. *DATAMES* ? ——— ?
Collection, Acad. Nat. Sci.: Phila., 1 ♀. Locality unknown.
1 specimen in United States.
22. *DATAMES* ——— ?
Collection, Acad. Nat. Sci., Phila., 2 ♂. Locality unknown.
2 specimens in United States.
23. *CLEOBIS MARTHA*, Karsh.
1 specimen in Europe.
24. *CLEOBIS* ? ——— ?
Collection, Hy. Edwards: 1 ♀, California.
Collection, Geo. Marx: 1 ♀, California.
2 specimens in United States.

120 specimens, 15 species in United States collections.
32 specimens, 18 species in European collections.
85 specimens, 8 species in J. Duncan Putnam's collections.
152 specimens, 24 species in all collections.

	United States.	America.
Named species.....	7	18
New species.....	2	6
Total.....	9*	24†

*Of these I have seen all. †Of these I have seen sixteen.

IN UNITED STATES COLLECTIONS.

Total 126 specimens.

Florida..... 5	Colorado.....11	Ariz. & N. M..... 6
Georgia 2	Wyoming..... 1	Mexico..... 8
Texas.....17	California.....11	Yucatan 1
Kansas..... 2	Arizona..... 4	Costa Rica 1
Chili.....50	No Locality..... 7	United States66

EXTRACTS

FROM THE NOTES AND CORRESPONDENCE OF J. DUNCAN PUTNAM, RELATING
TO THE SOLPUGIDÆ.

DENVER, COLORADO, Saturday, June 22d, 1872.

* * * In the afternoon I took a walk to the south-east of Denver. * * *
Under some dried dung I found the most curious spider (?) I ever saw. It
differs from any others very much.—[Journal, Vol. IV, 1872, page 12.

DENVER, Sunday, June 23d, 1872.

* * * * In the afternoon I wrote a letter * * to Prof. Hagen, of Cam-
bridge, Mass., giving a description of the spider (?) which I found yesterday,
and inclosed drawings of it, representing a view from above natural size; a
side view of the head and thorax enlarged, and an enlarged view of the up-
per part of the head. It seems to me that this insect must belong to the
order *Pedipalpi*, and family Solpugidæ, as limited by Packard in his
“Guide.”—[Journal, Vol. IV, 1872, p. 15.

EMPIRE CITY, COLORADO, Monday, July 8th, 1872.

* * * * I received * * * the following letter from Prof. Hagen, of Cam-
bridge, in answer to mine written from Denver in regard to a spider:

CAMBRIDGE, MASS., June 29, 1872.

MR. J. D. PUTNAM: Dear Sir—I am very happy to see your interesting
letter and figure of the spider. It belongs to the *Solpugida*, to the sub-fam-
ily of the Galeodes. So far as I see, it belongs to the genus *Gluvia* (Koch).
There are four species described from Mexico, *G. præcox*, *elongata*, *cineras-
cens*, *formicarius*, but the longest one is only six lines = twelve millim; so
perhaps your species is a new one, or a more adult. * * * * Of course
I will be glad to give you any information in my power.

Yours, truly,

H. A. HAGEN.

I believe there is no species described in American papers of *Gluvia*.—
[Journal, Vol. IV, 1872, page 46.

VALMONT, COLORADO, Sunday, June 28th, 1874.

I found under a stone, this morning, a very curious spider-like animal—
like one which I found in Denver two years ago, which Dr. Hagen said was
a new species of *Gluvia*.—[Journal, 1874, No. I, page 56.

[On July 18th, I found another specimen, also under a stone, and but a few feet distant from the above, but made no note of it, except on the label of the specimen.]

— —

CANON CITY, COLORADO, Friday, Oct. 23d, 1874.

Found another specimen of *Gluvia* under a piece of dry dung, in bed of sand creek, [sand creek is simply a bed of sand occupying the valley between the "hogback" and the mountains.]—Journal, 1874, No. III, page 11.

[Another specimen much smaller was collected November 4th, under a stone near the base of the limestone hogbacks north of Canon City.]

— —

IN "ENTOMOLOGICAL RECORD," 1874, page 4.

Gluvia ———. Found two specimens of this curious spider like Arachnid this summer, at Valmont, on June 28th and July 18th. Both were found under stones in a hot, dry place. I found one specimen of this same arachnid two years ago in Denver, under dry dung, and sent a drawing to Prof. H. A. Hagen, Cambridge, who wrote back that it was an undescribed species of *Gluvia*, a Mexican genus. At Canon City I found another specimen of the same, or a similar species under a piece of dry dung in the dry bed of sand creek, about two miles from town, on October 23d, 1874. Found another and much smaller specimen November 4th, under a stone, just back of town. It seems to be a different kind. These animals are very pugnacious, always ready to fight and struggle when they are caught; they are undoubtedly carnivorous in their habits. Usually I have found no other insect under the same stone, etc.—[Note Book, 1874, page 4.

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Museum Academy of Natural Sciences, Philadelphia:

Galeodes subulata, Say. A specimen of this species collected by Lieut. Marcy, in Arkansas, and probably the one described by Girard in Marcy's Report was shown me by Dr. McCook. It was not very well preserved and differs very considerably from the specimens of *G. pallipes*, which I have from Colorado. It is larger, more hairy and darker colored. I was unable to examine it very closely. Besides this there is one small specimen from Yucatan and three or four from unknown localities. * * —[Note Book, 1876, p. 33.

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Letter to Dr. A. S. Packard, Jr., Salem, Mass.:

DAVENPORT, December 1st, 1876.

* * * When in Colorado in 1872 and 1874, I collected several specimens of a species of *Galeodes*, and have since been much interested in finding out what they were. In your "Guide" page 655, you mention that "*S. (Galeodes) Americana*, Say, inhabits the Southern States." I should like very much to know where Say's description can be found. In the report (by Dr. James) of Long's Expedition to the Rocky Mountains, two species (*Gul.*

codes pallipes, Say, and *G. subulata*, Say) are described in a foot note on page 3, Vol. II. These specimens were collected at the base of the mountains near the Platte River, and therefore within a few miles of where I found my specimens—all of which correspond perfectly with the description of *G. pallipes*, and without doubt that is the correct name for them.

In the report of Marcy's Expedition, Girard gives a very full description of *G. subulata*, Say. He had but a single specimen collected somewhere in Arkansas. This specimen I saw at the Academy of Natural Science, in Philadelphia, and is certainly distinct from my Colorado specimens of *G. pallipes*. The above are all the references I can find in regard to the *Solpugida* of the United States.

Letter to Dr. H. A. Hagen, Cambridge, Mass.:

DAVENPORT, January 29th, 1877.

* * * I have continued my interest in the *Solpugida*, and succeeded about as well as I could expect with my poor facilities, and I hope you will allow me to ask of you a little help.

I have so far collected of this family five specimens in Colorado (one at Denver, two at Valmont, two at Canon City). These I have determined to be the species described by Say as *Galeodes pallipes*, which he collected at the base of the mountains, about fifteen miles from Denver (see Narrative Long's Expedition to Rocky Mountains, by Dr. James, Philadelphia, 1823, page 3, Vol. II) where *G. pallipes* and *G. subulata* are described in a foot note. The description applies perfectly, and the locality being almost precisely the same, I think I am quite safe in the determination. From an examination of the joints of the tarsus I am inclined to refer my specimens to the modern genus *Gluvia*, and this is the genus to which you referred it from my drawing in 1872.

In your library, I found a paper by Mr. Butler, of the British Museum, in the "Transactions Entomological Section, London, 1873," "A list of the species of *Galeodides*." He enumerates fifty-two species distributed among five genera, *Rhux*, *Ællorux*, *Galeodes*, *Solpuga* and *Gluvia*. Of these, *Gluvia* (with two exceptions) seems to be confined to the American continent, while all the others are old world species. Twelve or thirteen species of *Gluvia* are enumerated of which seven were described by Koch, and others by Latreille, Gervais, and Lucas. I copied a list of the species, but for want of time I neglected to make a note of the reference. This I regret, for I should like much to know where the species were described. Most of them, I suspect will be found in Koch's 'Die Arachniden' and Walckenaer's and Gervais 'Insectes Aptères.' The only library that possesses all these works in this country is that of the Philadelphia Academy, but that is nearly one thousand miles away. I must try and buy them for myself, if I can find them for sale anywhere.

In the Museum Comp. Zoology, I saw three specimens (two from Florida, one from California). These apparently belonged to two species, both of them distinct from my Colorado specimens.

In the Museum of the Boston Society I saw one specimen of a much larger species from Arizona, and Mr. Emerton stated he had two or three in his collection.

In the Museum of the Academy of Natural Sciences, Mr. McCook showed me a specimen labeled *Galeodes subulata*, collected by Marcy's Expedition to Red River. This is the specimen described by Girard in the report of that expedition, Washington, 1852. It is quite different from *G. pallipes*, and from any other species I have seen. Besides this there were several other smaller specimens without labels of any kind.

At Washington, Dr. Foreman, of the Smithsonian Institution, gave me a poorly preserved pinned specimen from Mexico.

This list is all the specimens I know of in the country. It is sufficient, however, to show that besides the two species described by Say, there are several others. It remains, however, to be shown that some of these were described by Koch and others, from Mexico and the West Indies.

So much for the specimens. The following are all the references to United States species I have been able to find:

SAY, in "Account of an Expedition from Pittsburg to the Rocky Mountains in 1819, 1820, under Major S. H. Long," by Edwin James, two Vols., 8vo., Philadelphia, 1823, describes *G. pallipes* and *G. subulata* in a foot-note on page 3 of Vol. II.

The same work, 3 Vols., 8vo., London, 1823.

(*G. pallipes* and *G. subulata* are described in a note in Vol. II, page 343.)

GIRARD, in "Report of Marcy's Exploration of the Red River of Louisiana in 1853," Washington, 1854, describes *G. subulata* from a single specimen.

I have seen three editions of this work, all bearing the same date, but paged differently.

PACKARD, in his "Guide to the Study of Insects," page 255, mentions that "*S. (Galeodes) Americana*, Say, inhabits the Southern States."

(I have not been able to find any other reference to this species, and think it must be a mistake.)

In "Proceedings of Academy of Natural Sciences," Philadelphia, Nov. 7th, 1871, "Prof. Cope exhibited a specimen of *Galeodes*, probably *G. pallipes*."

I shall be very glad to learn of any additions to this list, and for any other help or advice you can give. I should like very much to be able to examine more carefully those specimens in your charge, and if you will send them to me I will promptly return them in good order.

Letter to Rev. H. C. McCook, Philadelphia:

DAVENPORT, February 26th, 1877.

* * I was much pleased last Friday to receive the box of *Solpugidæ*, which arrived in good order. The Marcy specimen of *Galeodes subulata* was in pieces, but I believe it was so when I first saw it, last October. It evi-

dently had its head smashed by the person who collected it. In the bottle marked "Locality unknown" is a specimen in very good condition, which answers very well the description of *Galeodes subulata*, Say, and two specimens of *Galeodes pallipes*, Say. They are much larger and present a somewhat different appearance from the specimens I collected in Colorado, and the Major Burt specimen you send from Wyoming. The latter pleased me greatly and I am truly obliged to you for it. It is, I am sure, the true *subulata*, Say, and bears a striking resemblance in its general appearance to the specimens of *G. pallipes* from Colorado. This specimen is doubly interesting—on account of the species and the locality, so far north of where I should have looked for them. Both species seem to be represented in the south by much larger, darker colored specimens—such as the Marcy specimens and the "unknown" specimens. I wish I could get some idea of the locality of the latter, or even to know for certain that they are not Say's original specimens, for that idea comes over me sometimes, though they do not so well answer his descriptions as the more northern specimens. I am getting really very much interested in these queer animals, and am beginning to long for another chance to examine a little into their habits. I collected five specimens in Colorado, all at different times. They were found single and alone, under dry dung or a stone, in dry places. No other living thing was near them, and I always had them transferred to my collecting bottle before I had noticed how they walked. From an examination of the specimens it seems as though they had to walk with the body close to the ground, almost dragging. At least, it is impossible to bend the legs under the body, while they go over it easily enough. Another interesting question is, how they eat and what they eat. The stout clawed mandibles seem to be used to hold its food, while in some way the juices are conveyed to the mouth by means of the lingula which is inserted in the lower part of the front of the head (which is broad and flat), between the mandibles. The lingula is flat vertically, but I have not yet examined its structure carefully enough to describe it, though I have noticed that at its extremity are two minute palpi and it appears as though it could be withdrawn into the throat. It is probably impossible for a *Galeodes* to swallow anything solid. I have not yet found out how to distinguish between the sexes. Probably they are not very different in appearance. One of the specimens shown me by Dr. Hagen in Cambridge had an organ at the tip of the palpi that I have not noticed in any other specimen.

I shall examine the specimens as soon as I can, and will then return them to Philadelphia—it may be in a week or two. I should be very glad to keep two of the specimens in the "unknown locality" collection—one of each species—at least for longer study. The rest I will place in separate bottles, with the names as near as I can determine them. In this bottle are three specimens (two species) undoubtedly foreign; these I will probably only be able to refer to the genus.

From letter to Prof. F. H. Snow, Lawrence, Kansas:

DAVENPORT, IOWA, July 12th, 1877.

* * The four specimens of *Galeodes* arrived safely, and I am much obliged to you for the opportunity to examine them. Two of the specimens are truly *Galeodes pallipes*, Say, and two are good examples of *G. subulata*, Say—but what is most interesting, both the *pallipes* are of one sex (probably ♂) and both the *subulata* are of the other sex (probably ♀), and on making further examination of other specimens previously received, I find this to always be the case. Hence I have very good reason to believe that the two species are but the different sexes of one = *G. pallipes*, Say.

From letter to Dr. Parry:

DAVENPORT, IOWA, July 12th, 1877.

* * * I have not been doing much with the *Solpugidae* this hot weather. Received four specimens from Prof. Snow last week, and made the discovery that *G. pallipes* and *G. subulata* are two sexes of the same species. I hope I will be able to go to Mexico with you next winter, and then I can study these interesting animals at home. * * *

From letter to G. W. Belfrage, Clifton, Texas:

DAVENPORT, IOWA, July 13th, 1877.

* * * I received a few days since your letter, and to-day came another letter and the box. With the contents of the latter I am delighted. Among the pinned examples I find *Galeodes pallipes*, Say, one specimen; *Galeodes subulata*, Say, two specimens. (But these two species I find to really be the two sexes of one species.) The other species—smaller, darker colored and more flattened—is hitherto unknown from the United States, and very likely undescribed, except perhaps it be one of the four or five species described by Koch, from Mexico. * * *

To Prof. F. H. Snow:

DAVENPORT, IOWA, October 7th, 1877.

* * * I am glad to hear that you found the *Galeodes* so far east in Kansas as Buffalo Station and Fort Wallace. As the geographical distribution and variation of these insects is peculiar and interesting, I should be pleased to see the specimens, which I will of course return to you, together with those you sent me last spring. * *

Letter to Henry Edwards:

DAVENPORT, IOWA, March 5th, 1878.

* * * But I was most delighted with the box containing the *Solpugidae*. The two species of *Galeodes* are, without much doubt, both of them new or undescribed, though I have before me specimens of the same species loaned by Boston Society of Natural History and M. C. Z. I have been highly favored by the loan of specimens from nearly every institution in the country, so that I have splendid material for the study of N. A. species.

Letter to C. F. Parker, Acad. Nat. Sci., Phila.:

DAVENPORT, IOWA, April 4th, 1878.

* * I return to you to-day * * the specimens of *Galeodes* which were sent me for study. * * I have put each species in a separate bottle, and have also put in label giving genus and species when known. With the exception of the Marcy specimen—*Galeodes subulata*, Girard—they are all undescribed, but the localities being unknown I have hesitated to give them names. I have made drawings and memoranda of each of the species, and if hereafter I learn anything more definite regarding them, I will let you know. * *

From letter to Henry Edwards:

DAVENPORT, IOWA, August 2d, 1878.

* * * * In regard to the *Solpugidæ*, the large specimen you sent is certainly new. I have alcoholic specimens of the same from the Boston Society and Philadelphia Academy. The small is of quite a different appearance from *G. pallipes*, Say, to which it is most closely related. The California specimens I have seen (yours and one in collection of M. C. Z., Cambridge, and Bost. Soc. N. H.) are all small and poorly preserved, but, unless I find more certain evidence of their identity with *G. pallipes*, I will venture to describe them as new. Mr. Behrens sent me a large specimen different from any others, and from his letter I inferred that he found it near San Francisco. I have examined thirteen species of the family, nine of which are authentic North Americans; of the other four the locality is unknown. Probably five of these are undescribed. * *

From letter to Mr. Emerton:

DAVENPORT, IOWA, January 10th, 1879.

* * * Last February, I received by mail a small box containing four bottles of *Solpugidæ*. One of these, containing two specimens collected in Arizona by Mr. Palmer, appeared to be from the collection of the Boston Society N. H. One specimen marked S. H. Scudder, Lakin, Kansas, Sept. 1, 1877. One from Yucatan, and one from Costa Rica. I never received any word concerning the box, and so never knew just from whence it came, but some weeks before, Dr. Palmer had written to me that he had taken a number of *Solpugidæ* from Mr. Scudder's collection up to you at Salem, and that you would send them to me with some specimens to be loaned from your own collection. * * * The Kansas specimen from Mr. Scudder's is a young ♀ *G. pallipes*, Say. The Arizona specimens are both new, though one of them appears to be only a geographical form of *G. pallipes*. The Yucatan specimen is a ♂, and very similar to two ♀♀ of a new species which I received [blank in copy—probably "from Dr. Hagen",] Cambridge—a very pretty species. The specimen from Costa Rica may be *G. gracilis*, Koch, but it is in very bad condition. * * *

From letter to Mr. Greene:

DAVENPORT, IOWA, January 13th, 1879.

* * * I was much pleased a few days ago to receive your letter of December 30, from North Bloomfield. * * * But I must give you my especial thanks for the information regarding the *Galeodes* which shows that our species is nocturnal, and that it is attracted by light. There are four or five different species found in this country—those in California appear to differ from those found in Texas—hence my anxiety to get specimens from intermediate points.

From letter to G. W. Belfrage:

DAVENPORT, IOWA, March 10th, 1879.

* * * I was delighted Saturday to receive the small vial filled with *Solpugidæ*, for therein I found fine alcoholic specimens of both of the species of which you sent me dried specimens two years ago. The small one is without doubt *Glueia geniculata*, Koch—described originally from the Orinoco, South America, and the larger one is very near to *Galeodes pallipes*, Say, from the typical specimens of which it is, however, easily to be distinguished. * * *

Letter to Prof. Albert A. Wright, Oberlin College, Ohio:

DAVENPORT, IOWA, May 1st, 1879.

* * Your favor of April 29th and the *Galeodes*, have just been received. The latter is the *Galeodes subulata* of Say. (Report of Long's Expedition to Rocky Mountains, Phila., 1823, p. 3), which, however, is only the male of *G. pallipes*, described by the same author in the same place. The correct name, then, is *Galeodes pallipes*, Say. But the genus *Galeodes* has been subdivided, and this species will be placed in the genus *Datames*, Simon, but as M. Simon's paper has not yet been published, you had better for the present keep the name I have given above. * *

To E. A. Popenoe, Topeka, Kansas:

DAVENPORT, IOWA, Dec. 15, 1877.

* * * The *Solpuga* is *Galeodes pallipes*, Say, ♀. Am glad to see a specimen from so far east. * * [Ellis Co., Kansas.]

Compared Simon's description of *Cleobis limbata* and *C. cubæ* with my notes of the M. C. Z. specimens from Florida. (Note Book, Boston, Sept. 8, 1880.)

Copied the descriptions *C. limbata* and *cubæ*, Lucas, from Guérin's "Mag. de Zool.," of which Dr. Hagen happened to have the right numbers. (Note Book, Boston, Sept. 9, 1880.)

Compared the descriptions of *Cleobis cubæ* by Lucas and by Simon, and my notes on the specimens in the M. C. Z. They seem all to refer to the same species, but there are some inconsistencies. (Note Book, Boston, Sept. 10, 1880.)

Made a comparison of the specimens of *Galeodes* belonging to the collection (M. C. Z.) with the descriptions of Lucas and of Simon. The two specimens from Florida agree very closely with Simon's description of *Cleobis cubæ*, and not quite so closely with the original description of the same specimen by Lucas. The California specimen is without doubt *Datames californicus*, Simon. (Note Book, Boston, Sept. 10, 1880.)

Spent the day at the Academy of Natural Sciences, partly examining books, but mostly examining the specimens which they once sent to me. Determined the genera to which they belong, and replaced my old labels with new ones. There are several undoubted new species among them, and it is a pity that the localities are lost. (Note Book, Phila., Oct. 21, 1880.)

Spent the morning in Mr. Parker's room, examining *Galeodes*. Wrote descriptions of two of the species. (Note Book, Phila., Oct. 22, 1880.)

Spent morning at Academy. Wrote descriptions of two more species of *Galeodes*. The Marcy specimen appears to be the ♂ of *D. sulfurea*, but it is almost too large for that. (Note Book, Phila., Oct. 23, 1880.)

From letter to Geo. Marx:

DAVENPORT, IOWA, Dec. 18th, 1880.

* * * There are several very interesting forms among the *Solpugidæ* of your collection. There is a male of *Galeodes subulata*, Girard (not of Say), and three females which appear to be the same. The species is now certainly different from any other described. These are marked No. 13 (New Mexico, Arizona). Would it be possible to ascertain the more particular locality? Another specimen of peculiar interest is *Gluvia elongata*, Koch, described from Mexico, of which there is a specimen from Texas. This makes four species from Texas. Several other species may prove to be new. I recently received a small collection of Scorpions and Solpugidæ from Mexico. Among the latter one or two species which I cannot assign to any described species. These would indicate that a considerable number of new species are yet to be found when they are carefully collected.

BIBLIOGRAPHY OF SOLPUGIDÆ.

BY J. DUNCAN PUTNAM.

[The latter part of this paper (from No. 68) has been compiled from Mr. Putnam's Notes by Miss Julia E. Sanders.]

NOTE ON A BIBLIOGRAPHY OF THE GALEODIDÆ.—Having devoted my leisure moments for some time to a study of the *Galeodidæ*, I availed myself of the opportunity in the fall of 1880 to investigate the present condition of the literature of this very interesting and seemingly much neglected group of animals. In doing this, I visited all the principal scientific libraries in Cambridge, Boston, New York, Philadelphia, Baltimore, Washington, Chicago and Davenport. I found that this literature was much more voluminous than I had supposed, and I soon had a list of over two hundred and twenty works (including different editions of the same work) to be consulted, without taking into account the numerous references in the works of classic Greek and Roman authors supposed by Lichtenstein and others to refer to *Galeodæ* or *Solpuga*. Of these two hundred and twenty works all but about thirty-five were found in one or more of the libraries visited. Thirty of the works not seen were different editions or translations of the others; thus leaving but five works of importance not seen. A complete abstract of each work was made, thus furnishing material for a complete index and historical summary.

1. PETIVER, JACOB. *Gazophylacii naturæ et artis*, Decades decem. Folio, 1702-1711.

Not seen. Valentin (2) copies the figure of *Proscaraboides capensis* from this work. Tab. XX, Dec. 2, Fig. 1.

2. VALENTIN, MICHAEL BERNHARD. *Musei museorum, oder der algeimeiner kunst- und naturalien-kammer*. II tomus. Frankfurt am Mayn, 1714. [38 x 24 cm.]

Quoted as Valentin's Kunst-kammer. Tab. 34, fig. 5, copy of Petiver's figure above mentioned (1). P. 171. Brief reference to the plate and to Petiver's work (1).

3. SHAW, THOS. *Seiner Levantischen Reisen*, 1 Theil, S. 335 der Franz. Uebersetzung, 1738. Unter namen Boola-kaz (oder Bula-kas).

Quoted by Pallas (13), and Lichtenstein (28).

4. BELL, J. *Voyage de Russie*. Vol. III, p. 53, 1763.

Quoted by Pallas (13).

5. PETIVER, JACOB. *Opera, historium naturalem spectantia; or, Gazophylacium*. Vol. I. London, 1764. [35 x 23 cm.]

The collected edition of Petiver's works, of which two are here noted.

(a) *Catalogus classicus et topicus, omnium rerum figuratum in V, decadibus, sen primo volumine Gazophylacii naturæ et artis* [etc.]

P. [3] No. 410, 439, pl. 12, fig. 1, pl. 83, fig. 9. *Proscaraboides capensis singularis pedibus plumosis*.

(b) *Gazophylacii naturæ et artis, Decas nona: sen Herbarium capense*, [etc.]

- P. [9], tab. 85, fig. 9. Cape feather-legs, Cat. 410. Brief description. The two figures differ only in size, and appear to be very inaccurate and fantastic representations of a *Galeodes*. Pallas (8) states that the original drawings were more accurate. These figures form the basis of *Solpuga africana* of Lichtenstein (28).
6. SEBA, ALBERTUS. Locupletissimi rerum naturalium thesauri accurata descriptio et Iconibus artificiosissimis expressio. Tomus IV. Amsterdami, 1765. [49 x 32 cm.]
Quoted as "Thesaurus rerum naturalium." Tab. 99, fig. 14, text pp. 100, 101, *Araneus formæ infolite*. A wretched drawing of a *Galeodes*.
7. PALLAS, PETER SIMON. Reise durch verschiedene provinzen des Russischen reichs. Erster theil. St. Petersburg, 1771. [25½ x 19½ cm.]
Pp. 382, 383. General account of *Phalangium araneoides*. P. 476. Description of *Phalangium* [araneoides]. This appears to have been the first published description of this species, though the following work (8) was undoubtedly the first written, and both were published during the absence of Pallas in Eastern Russia and Siberia. Numerous editions of this work have been published, of which those seen will be noted.
8. PALLAS, PETER SIMON. Spicilegia Zoologica. Tomus I, fasc. 9. Bero-
lini, 1772. [25 x 19½ cm.]
Pp. 37-40. Detailed description of *Phalangium araneoides*. Tab. 3, figs. 7, 8, 9. Figures of the two type specimens (male and female) contained in the Museo Academiæ Petropolitane. In the prefatory note is a statement regarding the original drawings of Petiver's figures. This work was probably written before the last (7).
9. GMELIN, SAMUEL GOTTLIEB. Reise durch Russland zur untersuchung der drey natur-reiche. Dritter theil. Reise durch das nördliche Persien, in den jahren 1770, 1771, bis im April, 1772. St. Petersburg, 1774. [28 x 20 cm.]
Pp. 484, 485. General account of the appearance and habits of the *bychorcho*, which belongs to the *Phalangii*. Tab. 54. A very good figure of a *Galeodes*. Lichtenstein (28) thinks two different species are referred to in this work.
10. MULLER, PHILIP LUDWIG STATIUS. Des Ritters Carl von Linne * * *
volständiges natursystem nach der zwölften lateinischen ausgabe und nach anleitung des holländischen Houttuynischen werks, [etc.] Sup-
plements und register-band. Nurnberg, 1776. [8 vo.]
P. 341. Description of *Phalangium bychorcho*, from "Pallas' Reise" (7).
11. PALLAS, PETER SIMON. Reise durch verschiedene provinzen des Rus-
sischen reichs. 1st theil. Frankfurt, A. M., 1776. [4 to.]
Not seen. Mentioned in Engelmann's Bibl. Hist. Nat., p. 115.
12. CETTI, FRANCESCO. Anfibi e Pesci di Sardegna. Sassari, 1777. [17½ x
10½ cm.]
Pp. 53, 54. General comparison of the poison of the viper with that of other animals, including two species of "Solifugæ," to which specific names are not given.
13. PALLAS, PETER SIMON. Naturgeschichte merkwürdiger Thiere. * * *
I band, 9te sammlung. Berlin und Stralsund, 1777. [25½ x 20 cm.]
A translation of *Spicilegia zoologica* (6), with additions. Pp. 48-60. General account of the habits of *Phalangium araneoides*. Quotes extensively from D. WIER regarding the poisonous effects of its bite. This long, general account is not in the *Spicilegia* (8), though it is often quoted as if it was. Pp. 61-63. Description translated from the *Spicilegia* (8).

14. FABRICIUS, JOHANN CHRIST. Species insectorum exhibentes eorum differentias específicas, synonyma auctorum, loca natalia, metamorphosin adiectis observationibus, descriptionibus. Tom. I. Hamburgi et Kilonii, 1781. [20½ x 12 cm.]
P. 549. *Phalangium araneoides* of the Cape of Good Hope; brief notice. Suggests that it should form a separate genus.
15. [PALLAS, PETER SIMON.] Beytrag zur Naturgeschichte der giftigen Skorpion-spinne (*Phalangium araneoides*). Neue nordische Beyträge zur physikalischen und geographischen Erd- und Völkerbeschreibung, Naturgeschichte und Oekonomie. 2ter Band. St. Petersburg, 1781. [20 x 12 cm.]
Pp. 345-348. General account of the habits and poisonous qualities of *Phalangium araneoides*, mostly in the form of extracts from the journal of Herr C. R. LERCHE, 1734-1749, in Southern and Southeastern Russia.
16. CETTI, FRANCESCO. Naturgeschichte von Sardinien, Dritter Theil. Geschichte der Amphibien und Fische. Leipzig, 1784. [19 x 11 cm.]
German translation of (12). P. 55. Account of two kinds of Solifuga. This is the edition quoted by Lichtenstein (28) and Gervais.
17. FABRICIUS, JOHANN CHRIST. Mantissa insectorum [etc.] Tom. I. Hafniæ, 1786. [19½ x 12 cm.]
P. 347. *Phalangium araneoides* of Central Russia briefly defined and noticed.
18. HERBST, JOHANN FRIEDRICH WILHELM. Kurze Einleitung zur Kenntniss der Insecten für Ungeübte und Anfänger. Dritter Band. Berlin und Stralsund, 1787.
Pp. 145-147, pl. 80, fig. 2. General description of *Phalangium araneoides*. Plate not seen.
19. PALLAS, PETER SIMON. Voyages . . . en différentes provinces de l'Empire de Russie. . . . Paris, 1788.
French translation of (5). P. 604. General account of *Phalangium araneoides*. P. 738. Latin description. Not carefully examined, but probably the same as (23).
20. GMELIN, JO. FRID. Caroli a Linne. . . . Systema naturæ per regna tria naturæ. . . . Tomus I. Editio decima tertia, aucta, reformata. Lipsiæ, 1788. [20 x 12½ cm.]
Pars. 5, p. 2945. Brief description of *Phalangium araneoides*, with a short notice of habits and localities.
21. GMELIN, JO. FRID. Caroli a Linne. . . . Systema naturæ. Lugduni, 1789.
Volume containing *Phalangium* not seen; probably same as (20).
22. VILLERS, CAROLE DE. Caroli Linnæi Entomologia, Fauna Suecica descriptionibus, aucta DD. Scopoli, Geoffrey, De Geer, Fabricii, Schrank, etc. Tomus quartus. Lugduni, 1789. [19 x 11 cm.]
P. 85. Brief account of *Phalangium araneoides*. Observes that it should form a distinct sub-genus.
23. PALLAS, PETER SIMON. Voyages . . . en différentes provinces de l'Empire de Russie, et dans l'Asie septentrionale; Traduits de l'Allemand, par M. Gauthier de Peyronie. Tome I. Paris, 1789. [25 x 19½ cm.]
[Proc. D. A. N. S., Vol. III.] 36 [Jan. 20, 1883.]

French translation of (7). P. 604. General account of *Phalangium araneoides*. P. 738, No. 85. Latin description.

24. OLIVIER, GUILLAUME ANTOINE. Encyclopédie Methodique. Histoire Naturelle: Insectes. Tome 6. Paris, 1791. [26 x 20 cm.]

Pp. 578-580. Establishes the genus *Galeodes* upon the *Phalangium araneoides* of Pallas and *Galeodes setifera* n. sp. Gives full descriptions of the genera and species.

25. FABRICIUS, JOHANN CHRIST. Entomologica systematica emendata et aucta, [etc.] Tom. II. Hafniæ, 1793. [19½ x 11 cm.]

P. 431. Description of *Phalangium araneoides*. Gives characters which indicate it a true genus.

26. [UNKNOWN.] Tauride. Nordische Beytrage. Tom. V. P. 320. St. Petersburg, 1793 (?)

Not seen. Quoted by Lichtenstein (28) for localities of *Solpuga arachnodes*. Possibly by Pallas.

27. LICHTENSTEIN. ———. Catalogus musei zoologici ditissimi Hamburgi d. III Februar, 1796. Auctionis lege distrahende. Lectio tertia. Continens insecta. Hamburg, 1796.

Not seen. Title from Karsch (213). Pp. 216-218. Establishes the genus *Solpuga* on three species—*fatalis*, *arachnodes*, and *chelicornis*—without indicating which was type of the genus. Fabricius (30) quotes this work, with the date 1797, and the specific descriptions on pages 151, 152, and 195-197, so there may have been two editions. It is not mentioned at all by Lichtenstein (28).

28. LICHTENSTEIN, ———, und HERBST, JOHANN FRIEDRICH WILHELM. Naturgeschichte der Insekten-Gattungen Solpuga and Phalangium. Herbst's Natur-system der ungeflügelten Insekten. Erster Heft. Berlin, 1797. [29 x 23 cm.]

The preface and several notes by Herbst: all the rest relating to *Solpuga* by Lichtenstein. Pp. 1-22. A painstaking review of all previous authors who have mentioned animals that may be referred to *Solpuga*, including a large number of Greek and Latin classical writers. Pp. 22-31. Diagnosis; general and detailed descriptions of the genus *Solpuga*. Pp. 32-51. Synonymy, diagnoses, general and detailed descriptions of *Solpuga fatalis*, *S. persica*, *S. arachnodes*, *S. chelicornis*, *S. africana*, *S. scenica*, and *S. tarda*. Of these, *persica*, *africana*, *scenica*, and *tarda* appear to have been unknown to the author in nature, and the descriptions compiled from the accounts of others. Pp. 52-64. Concerning the habits and poisonous bites of *Solpuga*, almost entirely quoted from Pallas (13), although attributed to Pallas (8). Tab. I, fig. 1, *S. fatalis*; fig. 2, *S. arachnodes*. Tab. II, fig. 1, *S. chelicornis*; fig. 2, *S. africana*; the last copied from Petiver (5).

29. LATREILLE, PIERRE-ANDRE. Précis des caractères génériques des insectes dans un ordre naturelle. Paris, An 5 [1797]. [19½ x 12 cm.]

P. 188. Description of the genus *Galeodes*.

30. FABRICIUS, JOHANN CHRIST. Supplementum entomologiæ systematicæ. Hafniæ, 1798. [19½ x 11½ cm.]

P. 290. Genus *Solpuga* defined. Pp. 293, 294. Brief descriptions of *Solpuga fatalis*, *S. araneoides*, *S. chelicornis*. Refers to Lichtenstein (27), but not to (28).

31. EDITORS OF THE ENCYCLOPÆDIA LONDINENSIS. A general and universal system of natural history, comprising the three kingdoms of animals, vegetables, and minerals, arranged under their respective classes,

orders, genera, and species, by the late Sir Charles Linnæus. . . .
Improved, corrected, and enlarged, by J. Frid. Gmelin, M. D. . . .
Methodically incorporated and arranged by the editors of the Encyclo-
pædia Londinensis. Vol. XII. London. [No date.] [21 x 13 cm.]

P. 442. Popular description of *Phalangium araneoides*. Mentions that Herbst has ranked it under a separate genus, *Solpuga*. Not a translation from Gmelin (20).

32. SONNINI, C. S. Voyage en Grèce [etc.] Tome I. Paris, 1801.

Not seen. Pp. 115-124. A general description of *Galeodes araneoides* on the island of Cyprus. Pl. III, figures by Marechal, said to be very good. Quoted by Shaw (40), Van der Hoeven (153), and others.

33. SONNINI, C. S. Travels in Greece and Turkey, undertaken by order of Louis XVI, and with the authority of the Ottoman Court. Translated from the French. Vol. I. London, 1801. [21½ x 13 cm.]

Pp. 94-103. General and detailed account of *Galeodes araneoides*, its habits, poisonous qualities, and structure. Plates not seen.

34. PALLAS, PETER SIMON. Reise durch verschiedene Provinzen des russischen Reichs. Zweite Auflage. Erster Theil. St. Petersburg, 1801. Pp. 382, 476. Same as in the first edition (7).

35. LATREILLE, PIERRE-ANDRÉ. Histoire naturelle, générale et particulière des crustacés et des insectes. Ouvrage faisant suite à l'histoire naturelle générale et particulière, composée par Leclerc de Buffon. . . . Familles naturelles des Genres. Tome III. Paris, An X [1802.] [20 x 12 cm.]

P. 61. Genus *Galeodes* defined, with *araneoides* Oliv. as type.

36. TURTON, WILLIAM. A general system of nature, through the three grand kingdoms of animals, vegetables, and minerals. . . . Translated from Gmelin's last edition of the celebrated Systema Naturæ, by Sir Charles Linné. Amended and enlarged. . . . Vol. III. London, 1802.

P. 717. Description of *Phalangium araneoides* translated from Gmelin (20).

37. BLUMENBACH, J. FR. Manuel d'histoire naturelle. Traduit de l'Allemand, . . . par Soulangue Artand. Tom. I. Metz, An XI [1803.] [21 x 12½ cm.]

P. 512. Brief mention of *Phalangium araneoides*. German edition not seen.

38. LATREILLE, PIERRE-ANDRÉ. Histoire naturelle, générale et particulière des crustacés et des insectes. . . . Tom. 7. Paris, An XII [1804.] [20 x 12 cm.]

Pp. 307-313, Histoire des Galeodes. General description of the genus, its history, habits, anatomy, etc., containing some information evidently not obtained from books. P. 313. Brief descriptions of (*Solpuga fatalis*, *araneoides*, and *chelicornis*, placed by Fabricius in *Solpuga*. P. 45, fig. 1. "Galécide aranéoide," a reduced copy of Lichtenstein and Herbst's figure of *Solpuga fatalis*.

39. HERMANN, JEAN-FRÉDÉRIC. Mémoire apterologique. Strasbourg, An XII [1804.] [42 x 28½ cm.]

Pp. 13, 15. Establishes and defines the genus *Rhax* to take the place of *Galeodes* Olivier. No species mentioned.

40. SHAW, GEORGE, and NODDER, E. Naturalist's Miscellany. Vol. XV. [No date.] 1804 (?)

Plate 622. An original figure of a *Galeodes*. In the text, brief compiled account of the "poisonous solpuga," *araneoides*.

41. WALCKENAER, C. A. Tableau des aranéides. Paris, 1805. [21½ x 13½ cm.]

P. 1, foot-note. Remarks on the palpi of *Galeodes*.

42. DUMERIL, A. M. CONSTANT. Zoologie analytique, ou méthode naturelle de classification des animaux. . . Paris, 1806. [21 x 12½ cm.]

P. 291. Classification of genus *Galeodes*.

43. LATREILLE, PIERRE-ANDRÉ. Genera crustaceorum et insectorum, secundum ordinem naturalem in familias disposita. . . . Tom. I. Paris, 1806. [19 x 12 cm.]

Pp. 133-135. Detailed Latin description of *Galeodes*. P. 135. Synonymy of *Galeodes araneoides*.

44. TURTON, WILLIAM. A general system of nature, [etc.] Vol. III. London, 1806.

P. 717. Description of *Phalangium araneoides*. Same as (36).

45. OLIVIER, GUILLAUME ANTOINE. Voyage dans l'Empire Othoman, l'Égypte et la Perse. . . . Tom. III. Paris, 1807. [26 x 20 cm.]

Pp. 411-413. General account of the *Galeodes* found in Persia, their habits, etc., with descriptions of four species—*araneoides*, *phalangium*, *melanus*, and *arabs*.

46. OLIVIER, GUILLAUME ANTOINE. Atlas pour servir au voyage dans l'Empire Othoman, l'Égypte et la Perse. IIIème livr. Paris, 1807. [33 x 24½ cm.]

Pl. 42, figs. 3, 4, 5, 6, represent *Galeodes araneoides*, *phalangista*, *melana*, and *arabs*, respectively.

47. OLIVIER, GUILLAUME ANTOINE. Voyage dans l'Empire Othoman, l'Égypte et la Perse. Tom. 6. Paris, 1807. [20 x 12 cm.]

Seen, but not carefully examined. Atlas not seen. Same as (45), except in size. The account of *Galeodes* is on page 306, according to Van der Hoeven. A German edition is quoted by Keferstein (195), Reise nach Persien, p. 333.

48. LATREILLE, PIERRE-ANDRÉ. Considérations générales sur l'ordre naturel des animaux composant les classes des crustacés, des arachnides, et des insectes. Paris, 1810. [19½ x 12 cm.]

P. 130. Genus *Galeodes* defined briefly. P. 425. "*Galeode Solpuga araneoides*, Fab.," mentioned in "Table des genres."

49. SAVIGNY, JULES-CEsar. Zoologie de l'Égypte. Atlas. Animaux articulés. [No date.] 1811 (?) [70 x 52 cm.]

Pl. 8 is dated 1806-1811. Figs. 7, 8, 9, 10, fine representations, with many details, of four species of *Solpuga*. The plates appear to have been published some years in advance of the explanatory text.

50. SHAW, GEORGE, and NODDER, E. Naturalist's Miscellany. General indices . . . of the first XXIV Vols. London, 1813. [24 x 14½ cm.]

P. 11. *Solpuga venenosa*, vol. 15, pl. 622. P. 24. *Solpuga poisonous*, vol. 15, pl. 622.

51. LEACH, WILLIAM ELFORD. A tabular view of the external characters of four classes of animals, which Linné arranged under Insecta [etc.] Trans. of the Linnean Society of London, Vol. II. London, 1815. [28½ x 22 cm.]
P. 329. Classification of family *Solpugides* and genus *Solpuga*, with *S. araneoides*, Fab., for example.
52. KIRBY, WILLIAM, and SPENCE, WILLIAM. An introduction to Entomology; or elements of the natural history of insects. Vol. I. London, 1815.
P. 127. Reference to the bite of *Solpuga araneoides*, Fab., and of *S. fatalis*, Licht.
53. SAVIGNY, JULES-CESAR. Mémoires sur les animaux sans vertèbres. Première partie. Description et classification des animaux invertébrés et articulés, connus sous les noms de Crustacés, d'Insectes, d'Annélides, etc. Première fasc. Mém. 1-2. Théorie des organes de la bouche des crustacés et des Insectes. *Insectu*, Linn. Paris, 1816. [20 x 13 cm.]
P. 61. Mentions the poisonous "crochets mandibulaires" of the *Solpuges*.
54. KIRBY, WILLIAM, and SPENCE, WILLIAM. An introduction to Entomology. Vol. I, 2d ed. 1816.
Not seen. Probably same as first edition, 1815 (52).
55. LATREILLE, PIERRE-ANDRE. Le règne animal distribué d'après son organisation. Par M. le Chev. Cuvier. Tom. III, contenant les crustacés, les arachnides et les insectes. Paris, 1817. [20 x 12½ cm.]
P. 107. *Galeodes* defined and described. *Solpuga fatalis*, Fab., *S. chelicornis*, Fab., and *Phalangium araneoides*, Pallas, mentioned as examples.
56. LATREILLE, PIERRE-ANDRE. Galeodes. Nouveau dictionnaire d'histoire naturelle, appliquée aux arts, à l'agriculture, à l'économie rurale et domestique. Tome XII. Paris, 1817. [19½ x 12 cm.]
Pp. 368-373. General account of the genus *Galeodes*—characters, anatomy, habits, etc. Extracts from Olivier's voyage (45) regarding habits of *G. araneoides*, *G. phalangium*, *G. melanus*, and *G. arabs*. Extracts and criticisms of works of Pallas, Herbst, Savigny, etc. Mentions a small *Galeodes* found in America by Humboldt and Bonpland. P. 373. Describes *Galeodes dorsalis*, from Spain.
57. LATREILLE, PIERRE-ANDRE. Puice. Nouveau dictionnaire d'histoire naturelle. Tome XXVI. Paris, 1818.
P. 445. Speaks of not knowing a memoir published by M. Fischer, Director of the Cabinet of Natural History of Moscow, on the anatomy of *Galeodes*, in which he states that they have respiratory organs similar to the spiders. This is also mentioned by Kirby and Spence, Introduction, vol. 3, p. 23, but I have not succeeded in tracing the reference further.
58. LATREILLE, PIERRE-ANDRE. Tableau encyclopédique et méthodique des trois règnes de la nature. 24me partie. Crustacés, Arachnides, et Insectes. Paris, 1818. [30 x 22 cm.]
Pl. 262, figs. 1-5. *Galeodes araneoides*; copies of all the figures of Pallas (8). Pl. 341, figs. 6-12. *G. araneoides*, *G. phalangiste*, *G. arabs*, *G. melanis*—copies of all the figures of Olivier (46). Pl. 342, figs. 1-7. *Solpuga fatalis*, *S. arachnoides*, *S. chelicornis*, *S. africana*—copies of all the figures of Lichtenstein and Herbst. The explanation of plates 341 and 342 is found on page 11 of Explication des planches. I can find no further reference to *Galeodes* in the text than the work of Olivier (24).

59. AUDOUIN, VICTOR. Explication sommaire des planches d'Arachnides de l'Égypte et de la Syrie, publiées par Jules-César Savigny, offrant un exposé des caractères naturels des genres, avec la distinction des espèces. Description de l'Égypte, ou Recueil des observations et des recherches qui ont été faites en Égypte pendant l'Expédition de l'Armée Française, publié par les ordres de sa Majesté l'Empereur Napoléon le Grand. Histoire naturelle. Tome premier. Paris, 1809. Quatrième partie. Explication sommaire des planches dont les dessins ont été fournis par M. J. C. Savigny, pour l'histoire naturelle de l'ouvrage. [38 x 25 cm.]

P. 176. General account of the genus *Solpuga*. Pp. 176-178. Detailed explanations of figures on plate 8, *Arachnides* (see 49), giving the names *Solpuga araneoides*, Olivier, *S. intrepida*, Duf., *S. melanus*, Olivier, and *S. phalangium*, Olivier, to the four species figured. I have some doubt as to the date. That on the title-page is manifestly wrong, as the plates were not engraved until 1811 or 1812. 1818 is given in a book list, but references to Dufour make it probable that it was not published until after 1820. The plates seem to have been published in advance of the text. There is said to be an octavo edition of the text, of which I have no definite information.

60. LAMARCK, JEAN-BAPTISTE-PIERRE-ANTOINE DE MENNET, CHEVALIER DE. Histoire naturelle des animaux sans vertèbres. Paris, 1818. [20 x 12½ cm.]

Pp. 77-79. General notice of the genus *Galeodes*. Gives brief definitions and synonymy of *araneoides*, *fatalis*, and *cheilicornis*.

61. KIRBY, WILLIAM, and SPENCE, WILLIAM. An introduction to entomology. 3d ed. Vol. I. London, 1818.

P. 126. Remarks on bite of *Galeodes araneoides* and *fatalis*. Same as other editions.

62. DUFOUR, LEON. Description d'une nouvelle espèce de Galéode. Annales générales des sciences physiques. Tome 4me. Bruxelles, 1820. [22½ x 13 cm.]

Pp. 370-373. Description of *Galeodes intrepidus* (*dorsalis*, Latr.), anatomy, habits, speculations, etc. Pl. 69, fig. 7, rather poor figure, natural size, with details enlarged.

63. DUFOUR, LEON. Description de six espèces nouvelles d'Arachnides. Bruxelles, 1820.

Title of the paper in Ann. gen. des sci. phys. preceding the above on *Galeodes*. The two papers appear to have been reprinted with new pagination, that on *Galeodes* occupying pp. 16-20. This reprint I have not seen, but it is several times quoted by Kirby and Spence, Introduction 5th ed., Vol. III., p. 689, etc.

64. BILLBERG, GUST. JOH. Enumeratio insectorum, in Museo Gust. Joh. Billberg, 1820.

P. 129. Mentions genus *Galeodes*, Lmk., Oliv., Ltr., etc.; no species.

65. DUMERIL, ANDRE-MARIE-CONSTANT. Aranéides ou Acères. Dictionnaire des sciences naturelles. Tome II. Paris, 1820. [21½ x 13 cm.] P. 352. Mentions *Galeodes* in the table of genera.

66. DUMERIL, ANDRE-MARIE-CONSTANT. Galéode. Dictionnaire des sciences naturelles. Tome XVIII. Paris, 1820. [21½ x 13 cm.]

Pp. 75, 76. General historical and zoological account of the genus *Galeodes*. Brief descriptions of *Galeodes araneoides* and *G. dorsalis*. Atlas, Pl. Aptères, fig. 3. An original figure of *Galeodes araneoides*.

67. MACLEAY, W. S. *Hora entomologica; or Essays on the annulose animals.* Vol. I, part 2. London, 1821. [23 x 14½ cm.]
P. 381. Relations of *Galeodes* to the Phalangidea, Scorpionidea, and Araneidea.
68. DUMERIL, ANDRE-MARIE-CONSTANT. *Considérations générales sur la classe des insectes.* Paris, 1823. [23 x 14 cm.]
P. 237. Brief notice of genus *Galeodes*. Pl. 55, fig. 3. Figure of *Galeodes araneoides* same as in Dict. des Sci. Nat. (66.)
69. SAY, THOMAS. *Account of Expedition from Pittsburg to the Rocky Mountains in 1819–20, under command of Major Stephen H. Long.* Compiled by Edwin James. Philadelphia, 1823. Vol. II.
Pl. 2, 3. Description of first observation of *Galeodes*, at the base of the Rocky Mountains; also of the two species, *G. pallipes*, Say, and *G. subulata*, Say, then discovered. [Another edition published in London in 1823, in 3 Vols.]
70. LATREILLE, P. A., and SCHINZ, H. R. *Cuvier's Thierreich.* [German translation.] Stuttgart, 1823. [21 x 12 cm.]
Pp. 156–158. Simply the substance of the original (55).
71. AUDOUIN, VICTOR. *Dictionnaire classique d'Histoire Naturelle; par Messieurs Audouin, etc.* Tome VII. Paris, 1825. [17 x 10 cm.]
Pp. 116–118. General account of *Galeodes*. Special accounts of *G. araneoides*, Oliv. (24); *S. arachnoides*, Herbst (18), figured in Pl. LXVII [not certain if the same as *Phalang araneoides* of Pallas (8)]; *G. setifera*, Oliv. (24), is smaller than the preceding. *G. dorsalis*, Latr. (56), described by Dufour as *G. intrepida* (62).
P. 119. Reference to substitution of *Solpuga* for *Galeodes*, by Lichtenstein; also to names *Tetragnatha* and *Lucifuge* given to *Galeodes* by ancient naturalists. Book XVII, atlas and plates. Pl. LXVII, F. 5, 6, *Galeodes*.
72. LATREILLE, P. A. *Familles naturelles du Règne animal, etc.* Paris, 1825.
P. 319. Second family. *False scorpions, pseudo-scorpions*, defined.
73. KIRBY, WILLIAM, and SPENCE, WILLIAM. *Introduction to Entomology.* Vols. III–IV, 1826.
First and second editions in 1815 and 1816 (52 and 54). Third edition, 1818 (61). Fourth and fifth editions in 1828 (81 and 82).
74. MULLER, JOH. *Zur vergleichende Physiologie der Menschen und der Thiere.* Leipzig, 1826.
Quoted by Siebold (194) to the effect that *Galeodes* have six eyes. Also by Van der Hoeven (152 and 165), and mentioned in Friedlander's *Bücher-Verzeichniss*, Berlin, No. 290, 1879.
75. DUMERIL, C. *Dictionnaire des Sciences Naturelles.* Tome 49. Paris, 1827.
P. 454. *Solpuga* ou *Solifuga* (Entom.) defined. Reference to names, *Puice*, *Portepuice*, *Chelifere*, and *Obisium*, given to the genus.
76. BOITARD, PIERRE. *Manuel d'Histoire Naturelle.* Tome I. Paris, 1827. [14½ x 9 cm.]
Pp. 362, 363. General notice of *Galeodes*, classed in the family Faux-Scorpions, Order Les Trachéennes. No species mentioned.
77. LATREILLE, PIERRE-ANDRE, and BERTHOLD, DR. ARNOLD ADOLPH. *Natürliche Familien des Thierreichs, aus dem Französischen, mit Anmerkungen und Zusätzen von Dr. Arnold Berthold.* Weimar, 1827. [21 x 12½ cm.]

P. 305. Second family. *Pseudo-scorpions*. Describes palpes. Mentions species of Obisium, Chelifer, and *Galeodes*. Brief description of *Galeodes*.

78. SZOVITS, J. Notizen aus dem Gebiete der Natur und Heilkunde, gesammelt und mitgetheilt von Ludwig Friedrich v. Froriep. Erfurt bei Lossius. 1828. Nr. 16 des XXII Bandes.

Pp. 247, 248. Extract from a letter by J. Szovits, dated 11-23 June, 1828, published in the Journal de St. Petersburg, No. 109, of 11-23 September. He remarks that the nomadic Nogays, familiar with the *Solpuga araneoides*, affirm that its sting is not deadly.

79. STARK, JOHN. Elements of Natural History. Vol. II. Invertebrata, etc. Edinborough, 1828. [22 x 13½ cm.]

P. 204. Gen. 7. *Galeodes*, Oliv., defined. *G. araneoides*, Oliv. (Phalangium, Pallas). Definition, etc., from Nouv. Dict., XII, 373. [See 56.]

80. THIENEMANN, D. F. A. L. Lehrbuch der Zoologie. Berlin, 1828. [18 x 11 cm.]

P. 117. II. classe. 3 Geschlecht, Milbenskorpion; *Solpuga* defined. *Solpuga araneoides* defined.

81. KIRBY, WILLIAM, and SPENCE, WILLIAM. An introduction to Entomology, etc. Vols. I to II, 4th ed. London, 1828.

Vol. I, p. 125. Quotes Fabricius on *G. araneoides* (30); Lichtenstein on *G. fatalis* (27). [Same as other editions.]

82. KIRBY, WILLIAM, and SPENCE, WILLIAM. Introduction to Entomology. Vols. I to IV, 5th ed. London, 1828. [22½ x 14 cm.]

Vol. III, pp. 22, 23; 683, 689 and 696. Structure of *Galeodes*.

Vol. IV, pp. 395, 396. Comparison of structure of *Galeodes* with that of other Arachnids.

Pp. 397, 398. Definition and notes.

P. 667. Index of genera and species.

83. LATREILLE, PIERRE-ANDRE. Cuvier's Le Règne Animal, etc. 2d ed. 1829.

Pp. 273-275. *Les Galeodes*. Same as other editions.

P. 275. *S. fatalis*, *S. chelicornis*, *P. araneoides*, mentioned in foot-note, 1829-1831.

84. GUERIN, F. É. Iconographie du Règne Animal. 3d fascicle.

Pl. 3. Arachnids. *Galeodes spinipulpis*. Quoted by Latreille in Cours d'Entomologie, 1831 (87).

85. TIGNY, F. M. G. T. Histoire naturelle des Insectes, etc. 3me édition. Revue, augmentée, etc., par M. F. É. Guérin. Tome seconde. Paris, 1830. [13½ x 8 cm.]

P. 79. CCXX. Genre. *Galeode*. Generic characters. Genus established by Olivier, composed of two species of insects which by Pallas and Fabricius were confounded with the *faucheurs*, *phalangium*.

Pp. 79-82. Description from Olivier. Description of *G. araneoides*.

Pl. 109, bis. 1. *G. araneoides*.

86. EICHWALD, D. EDOUARDUS. Zoologia specialis quam expositis animalibus tum vivis, tum fossilibus potissimum Rossiae in universum, et Poloniae in specie, in usum lectionum publicarum, in Universitate Caesaria Vilmensi habendarum. Vilnae, 1830. [21 x 12 cm.]

P. 75. [Fam. XVII, Pseudo-scorpiones.]

Solpuga, Licht., *Galeodes*, Latr. [Generic characters, etc.]

P. 76. 1. *Solpuga araneoides*, Licht. Pallas, Spicil. Zool. (8). Characters.

87. LATREILLE, PIERRE ANDRÉ. Cours d'Entomologie, ou de l'Histoire naturelle des Crustacées, des Arachnides. Paris, 1831. [20½ x 12½ cm.]

Pp. 547, 548. Première Famille. Faux-scorpions. (Pseudo-scorpiones.) Definition and description of the genus *Galeodes*. Geographical distribution. Quotes Herbst (18), Olivier (45), Savigny (49), and Guérin (84). Adds that this genus is also found in the southern parts of America, but the descriptions are yet unpublished, and none have yet been found in Australia or Polynesia.

88. LATREILLE, PIERRE ANDRÉ; McMURTRIE, H. M. The Animal Kingdom, etc., by the Baron Cuvier, etc. The Crustacea, Arachnides, and Insecta, by P. A. Latreille. Translated from the French, by H. M. McMurtrie, M. D. 4 Vols., with plates. Vol. III. New York, 1831. [23 x 14 cm.] Same as in other editions.

P. 208. Note 2. Remarks that the author seems not yet aware of the recent discovery of two species of this genus near the Rocky Mountains, and gives brief description of *G. pallipes* and *G. subulata*, quoting Say (69).

89. LATREILLE, PIERRE ANDRÉ. Cuvier's Animal Kingdom (as 88), with additions to each order by Edward Griffith, F. L. S., A. S., and others. Vol. XIII. London, 1833. [24 x 15 cm.]

Pp. 496, 497. *Galeodes* as in former editions.

Pp. 510-18. Supplement on the Trachean arachnida. Genus *Galeodes*, its history, characters, and summary of its literature. General description apparently taken from Olivier. Habitat of the genus. Quotes from Olivier, who questions the venom of the *Galeodes*, and says they are attracted by light. Descriptions of *Phalangium araneoides*, Pallas; *Galeodes phalangium*, Oliv.; *G. melanus*, Oliv.; *G. arabs*, Oliv.; *Solpuga arachnoides*, Herbst; *G. setifera*, Oliv.; *G. dorsalis*, Dufour; and *S. fatalis*, Herbst. Pl. I., fig. 4, *G. spinipalpis*.

90. SUNDEVALL, DR. C. J. Conspectus Arachnidum quem Cons. Ampl. Fac. Phil. Lund.—Respondentibus Sveno Hardin et Erico T. Hammargren, Vermlandis. In Acad. Carolina die XXIV Aprilis, MDCCCXXXIII. Londini Gothorum. [19½ x 11 cm.]

P. 10, 11. Ordo 2, *Solifugæ*. Brief characters and general remarks.

P. 33. Fam. 4. *Galeodides*, description and classification.

91. DUGES, ANT. Annales des Sciences Naturelles. Rédigées pour la Zoologie par M.M. Audouin et Milne-Edwards. Seconde série. Tome premier.—Zoologie. Paris, 1834.

P. 5. Recherches sur l'ordre des Acariens en general et la famille des Trombidies en particulier, par M. Ant. Duges.

Pp. 7-9. Remarks on palpiform, or antennæ form, first feet of *Galeodes* as analogous to the labial palpi of insects. Further remarks on the structure.

P. 10. Table of the Arachnida.

92. LATREILLE, PIERRE ANDRÉ. The Animal Kingdom, etc., etc., by Baron Cuvier. The Crustacea, Arachnides and Insecta by M. Latreille. Vol. III. London, 1834. [21 x 31 cm.]

Pp. 315, 316. Family 1. Pseudo-Scorpions. *Galeodes*, Oliv. *Solpuga*, Licht. Fab. As in other editions (87 and 88).

Arachnides, Pl. 8, fig. 4, *G. spinipalpis*, Latr.

93. MILNE-EDWARDS. *Éléments de Zoologie*, 1re ed. Paris, 1834.
P. 984. Les Faux-Scorpions. Brief remarks on structure and habitat.
94. GOLDFUSS, AUG. *Grundriss der Zoologie*. 2ter ed. Nürnberg, 1834.
P. 248. Fourth Order. *Pseudo-scorpia*.
Galeodes, Oliv., *Solpuga*, Fabr. [very brief characters].
G. araneoides, Pall. (8) characters.
95. LUCAS, H. *Magasin de Zoologie*. Publié par F. E. Guérin. Aug., 1834.
First description by H. Lucas of *G. limbata*, Lucas, a new species found in Mexico.
With figure. Classe VIII, Pl. 5.
96. LUCAS, H. *Magasin de Zoologie*. Publié par F. E. Guérin. Aug., 1834.
Description by H. Lucas of *G. cubæ*, Lucas, a new species found in Cuba. With figure.
Classe VIII, Pl. 2.
97. OKEN, LORENZ. *Allgemeine Naturgeschichte, für alle Stände*. Vol. V.
2ter Theil. Stuttgart, 1835. [20 x 12 cm.]
P. 674. Quotes Pallas on *Solpuga* (*Galeodes*) and *P. araneoides*.
98. AUDOUIN, VICTOR. *The Cyclopædia of Anatomy and Physiology*.
Edited by Robt. B. Todd. Vol. I—A—DEA. London, 1835—1836.
Pp. 198-216. Arachnida. [By Victor Audouin.]
The only mention of *Galeodes* on page 200, in table of genera from Walckenaer.
99. KOCH, C. L. *Die Arachniden*. Dritter Band, erster Heft. Nürnberg, 1836.
Pp. 7-9. *G. araneoides*, detailed description, synonymy, with figures of both sexes.
Describes and figures, without naming, several specimens from Greece.
100. LATREILLE, P. A. *Cuvier's Règne Animal*, 3me éd. Bruxelles, 1836.
See (83). Tome 2, p. 296. *Galeodes*, etc.
101. LATREILLE, P. A., and VOIGT, F. S. *Das Thierreich, etc., etc.*, by Baron von Cuvier. Vierter Band. Leipzig, 1836. [21½ x 12½ cm.]
P. 404. Translation from the French, with brief reference to *G. fatalis* and *G. araneoides*, with diagnoses of these species.
102. BURMEISTER, HERMANN. *Handbuch der Naturgeschichte*. Berlin, 1836.
P. 580. V (LXV) Zunft, *Solifugæ*.
13 (202). Fam. *Galeodidæ* defined.
P. 581. Brief description of *G. fatalis*.
103. GUERIN, F. E. *Iconographie du Règne Animal, de G. Cuvier, etc., etc.* Tome II. Planches des Animaux invertébrés. Paris, 1829-1844.
[24 x 15 cm.]
Arachnides Pl. III, fig. 4. *Galeodes spinipalpis*, Latr.
Tome III, P. 11. Latreille's description of *G. spinipalpis*. Explanation of figure.
Quotes Lucas (95 and 96.)
104. WALCKENAER, C. A., and GÉRAIS, PAUL. *Histoire Naturelle des Insectes*. Aptères. Tome I. Paris, 1837.
P. 39. Classification. Description of the *Solpugides*.
105. KEFERSTEIN, A. *Naturgeschichte der schädlichen Insecten, etc.* Erster Theil. Erfurt, 1837. [17½ x 10½ cm.]
Page 303. Account of *P. araneoides*, Pall., Fabr., from the works of Pallas, Olivier, etc. Refers to Pallas (7, 8, 13 and 15), Froriep (78), Olivier (47).

106. KAUP, DR. I. J. Das Thierreich in seinem Hauptformen, etc., etc. Dritter Band. Zweiter Theil. Darmstadt, 1837. [21 x 12½ cm.]
Page 32. [Spinnen.] Afterscorpione.
Solpuga, Licht., defined.
S. fatalis. [A very good copy of Licht. and Herbst's figure]. Brief characters.
107. VOGT, F. S. Lehrbuch der Zoologie. Stuttgart, 1838. [21½ x 12½ cm.]
P. 121. C. Solpugen. General remarks. VI. *Galeodes* defined. *G. araneoides* defined.
Quotes *Pallas* (8), general description.
Refers to *G. cubæ*, Lucas (96).
T. XV. Fig. 21. *G. araneoides*. [Poor copy from *Pallas* (8), half size.]
108. LAMARCK, J. B. P. A. DE. Histoire Naturelle des Animaux sans Vertebres, 2re ed. Tome V. Paris, 1838.
P. 7. Mentions the *Galeodes* as nearly connected with the Spiders.
Pp. 105-107. Les Faux-scorpions. [As in 1st ed. (60), and 3d (109.)]
109. LAMARCK, J. B. P. A. DE M. DE. Histoire Naturelle, etc., 3me éd. Tome II. Bruxelles, 1839.
Pp. 300, 301. False Scorpions. General description.
Galeodes. Description and observations.
Descriptions of six species, with references to authors writing of them.
110. SALACROUX, A. Nouveaux Éléments d'Histoire Naturelle. Tome II. Paris, 1839. [20 x 13 cm.]
Pp. 75, 76. Faux-scorpions. General description. Les *Galeodes* (*Solpuga*).
(1), "Derive par corruption de *solifuga*, qui fuit le soleil, parce que ces animaux recherchent les tenebres."
General description. Mentions *G. araneoides* as the principal species, found at the Cape of Good Hope.
111. KOCH, C. L. Uebersicht des Arachniden-Systems, 2ter Heft. Nürnberg, 1839.
Pp. 6, 7. Fifth Order. Kanker. *Solpugæ*.
Family I. Poison-kanker. *Galeodites*.
I. *Galeodes*, Oliv., *Solpuga*, Licht., Fab., Herbst.
Mentions difference of the mouth-parts, which separates the species into two genera.
Quotes Walckenaer (126), the first part of whose work must have been in circulation some years before 1844, the date of the copy or edition seen. Gives name *Rhax* to the genus, and designates its species.
112. DUVERNOY, G. L., and CUVIER, G. Leçons d'Anatomie comparée de Georges Cuvier, rédigées et publiées par G. L. Duvernoy. 2me éd. Tome VII. Paris, 1840. [20 x 30 cm.]
P. 467. Brief description of the mouth-parts of the *Galeodes*.
113. LATREILLE, P. A., and WESTWOOD, J. O. Cuvier's Animal Kingdom, etc., etc. The Articulated Animals, by J. O. Westwood. Illustrated. London, 1840.
P. 467. The first family of the Trachean Arachnida. Pseudo-scorpions. [Characters, etc.] *Galeodes*, Oliv. [Same as in edition of 1863.] Fig. 33. *Galeodes intrepida*.
114. GUERNEL, F. DE. Elements d'Histoire Naturelle. 2me Partie. Paris. [19 x 11 cm.]
[First part dated 1841.] Pp. 148, 149. Classes defined.
Families *Phalangiens* and *Galeodes* defined. Mention of *Galeode d'Afrique*, and *Galeode d'Espagne*.

115. [ZOFINGER.] Die Thierwelt geordnet nach dem natürlichen System des Prof. Oken. Leipzig, 1841. [21 x 11½ cm.]
 [Mss. addition to title: "Von Zofinger Lehrer in Halle, 1841."]
 P. 53. Achte Zunft. Spinnen. "Die Walzenspinne im südlichen Russland und Kaukasien." Brief remarks on poison of its bite; that Calmucks bathe the bitten part in camel's milk, etc.
116. KOCH, C. L. Archiv für Naturgeschichte, gegründet von A. F. A. Wiegmann, etc., etc. Achter Jahrgang. Erster Band. Berlin, 1842.
 Pp. 350, 351. Systematische Uebersicht über die Familie der *Galeoden*, von C. L. Koch, Kreisforstrath in Regensburg.
 Remarks on classification. A very full diagnosis of the structure of the *Galeodes*, pointing out the distinctive characteristics, by which the author has separated them into different genera and species.
 Pp. 351, 356. Full classification of all known species, with descriptions and localities, dividing them into five Genera, containing, in all, twenty-nine species.
117. GERVAIS, PAUL. Soc. Phil. de Paris, in Journ. l'Institute, 1842.
 P. 72. Description of *Galeodes brevipes* and *G. gryllipes*.
118. KIRBY, WILLIAM, and SPENCE, WILLIAM. Introduction to Entomology, etc. Vols. I and II. 6th edition, 1842.
119. LUCAS, H. Histoire Naturelle des Crustacés, Arachnides, et Myriapodes, 1842.
 Pl. 447. [Not seen.] Date in Holden's list. Quoted by Kittary (140). 1842.
120. HUTTON, THOS. Journal of the Asiatic Society of Bengal. Vol. XI, Part II. July to December, 1842. New Series. Calcutta. [23 x 13 cm.]
 Pp. 857-863. Capt. Thos. Hutton on *Galeodes (vorax?)*
 Same account as in (121).
121. HUTTON, THOS. Annals and Magazine of Natural History. London, 1843. [23 x 14 cm.]
 No. 75. August, 1843. Pp. 81-85.
 IX. Observations on the habits of a large species of *Galeodes*, by Capt. Thos. Hutton. Proposes the name of *Galeodes vorax*. General remarks on habits. An interesting account of the incubation and peculiar development of more than fifty *Galeodes*; their voracity and pugnacity, habitat and description of structure. Says, "It is probably the species mistaken by Elphinstone for the Tarantula, which he describes as common to that country (Afghanistan), but which I neither saw nor heard of." Brief general description.
122. HUTTON, THOS. Froriep's Neue Notizen aus dem Gebiete der Natur- und Heilkunde, etc., etc., von L. F. von Froriep und Dr. Robert Froriep. XXVIIIster Band. October to December, 1843. Weimar. [25 x 20½ cm.]
 No. 598. October, 1843. Columns 49-54.
 Translation of Hutton's article in Ann. and Mag. of Nat. Hist. (121).
123. WEIGMANN, F. A., and RUTHE, J. F. Handbuch der Zoologie, 2ter ed. Revised, enlarged, etc., by Dr. F. H. Troschel and J. F. Ruthe. Berlin, 1843. [21 x 12½ cm.]
 P. 517. *Galeodes*, very brief characters. *S. fatalis* regarded as poisonous.
124. SCHILLING, PETER SAML. Ausführliche Naturgeschichte der Fische und der wirbellosen Thiere, etc. Zweite Ausgabe. Breslau, 1843. [22 x 13 cm.]
 Pp. 268-277. II. Ordnung: Tracheen-Spinnen.

1. Skorptionspinne (*Solpuga*). General characters. General description of *Solpuga araneoides*, with localities. Mention of the "dangerous" *Solpuga fatalis*, of East India.
Tab. 30, fig. 4. Reduced copy of *Solpuga fatalis*, from Licht. and Herbst (28).
125. MILNE-EDWARDS, H. Éléments de Zoologie, etc. 2me éd. Animaux sans Vertèbres. Paris, 1843. [$20\frac{1}{2} \times 11\frac{1}{4}$ cm.]
P. 181. Brief mention of *Galeodes* under § 1203. Les Faux Scorpions; same as (93).
126. WALCKENAER, C. A., and GERVAIS, PAUL. Histoire Naturelle des Insectes. Aptères. Tome III. Paris, 1844.
[Aceres, *Solpugides*, etc., etc., par M. Paul Gervais.]
Pp. 85-93. Order IV: *Solpugides*. Characters, habitat, and remarks. The single family *Solpugidæ* referred to the order *Phalangidæ*. Description of genus *Solpuga*. References to earlier authors. Remarks on restoring the name *Galeodes* to this genus as being more anciently given. Quotes Hutton as best authority on habits of *Galeodes*, from original observation (120, 121). *Solpugas* of the old world, ten species described. *Solpugas* of America, four species described, from Central America, Cuba, Mexico, and Martinique. Remarks on the prodrom of Koch's monograph of the genus *Solpuga*, comprising twenty-nine species. Names the genera, species, and habitat of those described by Koch (116).
127. ERICHSON, DR. W. F. Reports on the Progress of Zoology and Botany. Edinburgh, 1841-1842. Printed by the Ray Society, 1845. [$22\frac{1}{2} \times 14$ cm.]
[Insects, Arachnida, etc., by Dr. W. F. Erichson.]
Pp. 265-67. *Solifugæ*. [Includes Phrynus, Scorpio, Chelifer, and Galeodes.] *Galeodidæ*. Mentions Koch's systematic view of this family (116), names his genera, with definition and number of species of each. Refers to new species figured in Guérin's Mag. de Zoologie.
128. LATREILLE, DUGES, and MILNE-EDWARDS. Cuvier's Règne Animal, etc. Par une réunion de disciples de Cuvier, MM. Audouin, Dugès, Milne-Edwards, etc., etc. Paris, 1837-1845. [$26\frac{1}{2} \times 18$ cm.]
Les Arachnides. Avec un atlas. Par M. Ant. Duges et M. Milne-Edwards.
Pp. 82, 83. Same as in other editions, with additions of references to plates. Atlas. Arachnides, Pl. 20, figs. 1 to 1 f. [Three from nature, four after the plates of M. Savigny.]
Pl. 20 bis. figs. 1 to 1 f.; 2, 2 a, b, and c. Anatomical figures of *Galeodes*.
129. CARPENTER, WM. P. Popular Cyclopædia of Natural Science, etc. Vol. II. London, 1845. [20×12 cm.]
P. 227. Pseudo-scorpionidæ noticed, *Galeodes* habitat, and very brief characters. Fig. 448. *G. intrepida*. (A coarse outline of one of Savigny's figures.)
130. BLANCHARD, EMILE. Comptes rendus hebdomadaires des Séances de l'Académie des Sciences. Tome 21me. Juillet-Décembre, 1845. Paris. [Séance du 22 Decembre, 1845.] [$25\frac{1}{2} \times 19\frac{1}{2}$ cm.]
P. 1383. Zoologie. Observations sur l'organisation d'une type de la classe des Arachnides, le genre *Galeode* (*Galeodes*, Latr.) Par M. Emile Blanchard. (Extrait.) (See 138.)
Pp. 1383-86. Observations on the structure, from which the author concludes that the Arachnids are more nearly related to the Crustacea than to insects.
131. BLANCHARD, EMILE, and LUCAS, H. Dictionnaire universel d'Histoire Naturelle, etc., etc. Dirigé par M. Charles d'Orbigny. Tome 2me. Paris, 1845. [$24 \times 13\frac{1}{2}$ cm.]
[Article.] *Arachnides*, pp. 56-60. Signed Bl. (Blanchard.)

Mentions *Solpugides*, analogous to false scorpions. Tome VI. P. 1-2. *Galeode Galeodes*, Arach. Signed H. L. (Lucas.) Definition and derivation. General description, etc. Quotes Hutton, (120, 121); Gervais (126); Dufour on the new species, *G. intrepida*, Duf. (62), *G. dorsalis* of Latreille (56). Description, habitat, etc., of a species collected by the author in Algeria, supposed to be *G. araneoides*, Oliv. Refers to M. Koch's monograph (116).

132. AGASSIZ, LOUIS. Nomenclator Zoologicus, continens Nomina systematica generum animalium tam viventium quam fossilium, etc. Soloduri, 1812-1846. [25½ x 21½ cm.]

Nomina systematica Generum Arachnidarum tam viventium quam fossilium, etc. Auctore L. Agassiz. Recognovit Guil. F. Erichson.

Pp. 1-13. Names given to the genus *Galeodes* and its divisions, with authors and dates.

133. AGASSIZ, LOUIS. Nomenclatoris Zoologici Index universalis, etc. 1846. [27 x 21½ cm.]

P. 9, Aellopus. P. 158, Galeodea. P. 163, Gluvia. P. 283, Phalangium. P. 309, Proscarabæus. P. 323, Rhax. P. 344, Solifuge.

134. BLANCHARD, EMILE. In Froriep's Neue Notizen. XXXVII Band. January, 1846. Col. 117-18, 119-20.

[Translation of 130.]

135. DUMERIL, A. M. CONSTANT. Éléments des Sciences Naturelles, 5me éd. Tome II. Paris, 1846. [17½ x 11 cm.]

P. 90. Mentions *Galeodes*, with other Arachnids, as having "mandibules fendues comme des tenailles."

136. WHITE, ADAM. Life in the Wilderness, or Wanderings in South Africa. By Henry H. Methuen. London, 1846. [20 x 12½ cm.]

Pp. 307-11, Appendix. List of Annulosa, principally insects, found on the journey of Henry H. Methuen, Esq. Drawn up by Adam White, M. E. S., etc. Mentions former collectors of insects in South Africa, and Mr. Arthur Pearson as entomologist of Mr. Methuen's company.

P. 317. Several new species of Aptera found; among them a new species of *Galeodes*, named by the author, *G. hostilis*. Figured pl. 2, fig. 5, explanation on page 318.

137. KIRBY, WILLIAM, and SPENCE, WILLIAM. Introduction to Entomology, etc. From the 6th London ed. (118). Philadelphia, 1846. [9¼ x 5¾ in.]

P. 102. *G. araneoides*, localities, with reference to Fabricius (25) and to Lichtenstein (28) for *G. fatalis*.

138. BLANCHARD, EMILE. Annales des Sciences Naturelles. 3me S. Zoologie. Tome 8. Paris, 1847.

[(130) an extract from this memoir.]

Observations sur l'organisation d'un type de la classe des Arachnides, le genre *Galeode* (*Galeodes*, Latr.) Par M. Emile Blanchard.

Pp. 227-38. General remarks. Mentions specimens of *G. barbara*, Lucas, well preserved in liquor by M. Lucas. Quotes Latreille for antennae pincers, and Dict. Univ., etc., page 56 (131), for mandibles. Refers to the figures of small buccal pieces by Savigny (49), and Milne-Edwards (128). Figs. 1 to 3 of different parts of the anatomy of the *Galeodes*. Pl. 6, structure of *G. barbara*, Lucas.

139. WALCKENAER, C. A., and GERVAIS, PAUL. Histoire Naturelle des Insectes. Aptères. Vol. IV. Paris, 1847.

Pp. 339-343. Order IV: *Solpugides*. For names given to this order, refers to Leach (51). for *Solpugides*; Kirby and Spence (73, 82), *Galeodes*; Sundevall (90), *Galeodides* or *Solifugæ*. Remarks on habitat, structure, etc. A minute description of the organization of the *Solpugides* (as constituting them a distinct group), from close study of specimens preserved in alcohol. Quotes the opinions of many authors on the uses of the different organs and appendages peculiar to the structure of the *Solpugides*. To the fourteen species of *Galeodes* before mentioned (126), adds *G. dorsalis*, Latr., *G. barbara*, Lucas, *G. variegata*, Gervais, and *G. morsitans*, Gervais (with references to authors and figures), and Latreille reports that M. Poe has discovered a species in the environs of Havana.

140. KITTARY, DR. MODEST. Bulletin de la Société Impériale des Naturalistes de Moscou, 1848. Tome XXI, 2de partie. 8vo.

Anatomische Untersuchung der gemeinen (*Galeodes araneoides*), and der furchtlosen (*Galeodes intrepida*) Solpuga, von Dr. Modest Kittary. (Pp. 307-371. Pls. VI-VIII, figs. 1-18.)

P. 309, Pl. 1. *G. intrepida*, Dufour.

Full and minute descriptions, with figures, and elaborate descriptions of the figures, of the general external organs, muscular system, respiratory organs, internal organs, circulatory system, digestive organs, sexual organs, and nervous system.

141. KOCH, C. L. Die Arachniden. Getreu nach der Natur abgebildet und beschrieben. 15ter Band. 4-5 Hefte. Nürnberg, 1848.

Pp. 70-103, Tab. DXXIV to DXXXIII, figs. 1465 to 1489.

Descriptions of twenty-five species, with figures and localities.

142. LUCAS, H. Exploration scientifique de l'Algérie, 1840-1842. Publiée par ordre du Gouvernement. Paris, 1849. [37 x 28 cm.]

Histoire naturelle des animaux articulés, par H. Lucas. 1re partie. Crustacés, Arachnides, Myriapodes, et Hexapodes.

Pp. 255, 279-80. *G. barbara*, Lucas. Pl. 18, fig. 7. Latin description, detailed French description, with interesting original observations on their localities, habits, and peculiarities.

P. 256. *G. intrepida*. Quotes Walckenaer (126) and Savigny (49) for descriptions and figures. Latin description, French detailed account, with original observations.

P. 279. Classe II, Arachnides. Ordre IV, Les Solpugides, etc. Mentions perfect figures of mouth-parts, by Milne-Edwards (123). Note 1. Quotes Blanchard (130) on forcipules of arachnids, regarded by some entomologists as but modified antennæ.

143. BLANCHARD, EMILE. Annales des Sciences Naturelles. 3me S. Tome 12, Zoologie. Paris, 1849.

P. 317. De l'appareil circulatoire et des organes de la respiration dans les Arachnides. Par M. Emile Blanchard.

P. 321. Refers to Blanchard (138), and Dr. Kittary (140).

P. 323, note. Remarks on presence of prolongments or *diverticulum* in the stomach of *Galeodes*. Notices the criticisms of M. Dufour (144).

Pp. 317-351. Describes the organs of various arachnids, comparing them with those of Crustacea and Insects. Pls. 6, 7, 8.

144. DUFOUR, LEON. Comptes rendus Acad. Sci. Tome 28. Janvier-Juin, 1849. Séance du 12 Mars, 1849. Paris. P. 340. Entomologie.

Observations critiques sur l'organe digestif du *Galeodes*, par M. Leon Dufour. Pp. 340-342. Remarks that he had been preparing materials relative to the anatomy of the *Galeodes*, and circumstances having prevented publication, he had been anticipated on this point by M. Milne-Edwards and M. Emile Blanchard. His dissections have been upon a large *Galeodes* inhabiting Algiers, provisionally accepted by M. Dufour as *G. barbara*, Lucas. Compares his anatomical observations with those of M. Blanchard. Gives detailed description of the digestive organs.

145. BLANCHARD, EMILE. Comptes rendus Acad. Sci. Tome 28, 1849. Séance du 19 Mars, 1849.

Pp. 388, 389. Entomologie. Response a une note de M. Leon Dufour, relatif a l'appareil digestif des Galeodes, par M. Emile Blanchard. (Extrait.)

Defends his views regarding the "*diverticulum de l'estomac*" against the criticism of M. Dufour. Offers to exhibit a preparation of the digestive canal of *G. barbara*, isolated in all its length, etc., etc.

146. DUFOUR, LEON. Comptes rendus Acad. Sci. Tome 28, 1849. Séance du 23 Avril, 1849.

Pp. 523-528. Anatomie comparee. Sur l'appareil digestif du Scorpion et du Galeode; par M. Leon Dufour. (Extrait.) Replies to M. Blanchard; giving many details of the digestive and circulatory organs of *Galeodes*, comparing them with those of other arachnids. Quotes various authors, none referring especially to *Galeodes*.

147. BLANCHARD, EMILE, and DUFOUR, LEON. L'Institut; Journal universel des Sciences, et des sociétés savantes, en France et a l'étranger. liere Section, Sciences Mathematiques, Physiques et Naturelles. Nr. 795, 28 Mars, 1849. Paris. [31 x 21½ cm.]

Pp. 98, 99. Resume of the controversy upon the digestive organs of the *Galeodes* between M.M. Blanchard and Dufour. Quotes from Dufour (144), and Blanchard (145.)

148. GERVAIS, PAUL. Historia fisica y politica de Chile, etc. etc., por Claudio Gay. * * * * Zoologia. Tomo Cuarto. Paris. * * * Chile. * * * * Santiago. 1849. [21 x 13 cm.]

Pp. 14-17. Fauna Chilena. Arachnides. Orden III. *Galeodidos*. General remarks, characters, etc., after Walckenaer and Gervais (139). Describes *G. variegata*. (Atlas Zoologica; Arachneideos, lam. I, fig. 2). (Plates beautifully engraved and colored.) *G. morsicans*; lam. I, fig. 2.

149. LUCAS, H. Annales de la Société Entomologique de France. Deuxième Série. Tome 7me. Paris, 1849.

Bulletin. Séance du 28 Mars, 1849.

Reviews M. Dufour's provisional acceptation of the species *G. barbara*, Lucas. Describes the species, gives its analogies and differences, and asserts its position as a wholly distinct species.

150. KITTARY, MODEST. Tagsberichte über die Fortschritte der Natur, etc., von Dr. Robert Frieriep. Band I. Weimar, 1850, [20½ x 12 cm.]

Nr. 108. May, 1850. Pp. 156-160. Extract from Nr. IV, du Bulletin de la Soc. Imp. des Naturalistes de Moscou, 1848 (140). Nr. 110, May, 1850, pp. 161-168, continuation.

Nr. 123, May, 1850, pp. 169, 170, continuation.

Eighteen figures copied, some of them slightly reduced.

151. KOCH, C. L. Uebersicht des Arachniden-Systems, 5ter Heft. Nürnberg, 1850.

Pp. 95-98. Sixth order. Kanker, Solpugæ. Characters of the family *Galeodides*. Generic characters of genera *Solpuga*, Licht.; *Galeodes*, Oliv.; *Aellopus*; *Rhuz*, Herm.; and *Gluvia*, and division into twenty-six species, with plates.

152. VAN DER HOEVEN, J. Handbuch der Zoologie. Erster Band. Leipzig, 1850. [8½ x 7¼ in.]

P. 564. Ordo VI, *Solifugæ*. Familia XII. (CXLII). Brief Latin definition.

P. 565. Brief definition of *Galeodes*, Oliv., Latr. (*Solpuga*, Licht., Fabr.) Reference to species, authors describing them, and their works.

153. LUCAS, HIPP. Histoire naturelle des Crustacés, Arachnides et Myriapodes. Paris, 1850. Pl. 447.
Quoted by Kittary. Not seen. Another edition, 1842, vide Holden.
154. GIEBEL. Allgemeine Encyklopädie der Wissenschaften und Künste, von J. S. Ersch und J. G. Gruber. Leipzig, 1851. [28 x 24 cm.]
Vol. LII, p. 346. *Galeodes* defined.
155. DESMAREST, E. Encyclopédie moderne Dictionnaire abrégé des Sciences, etc., etc. Nouvelle édition. Tome XVI. Paris, 1852. [23 x 14 cm.]
Vol. 16, p. 134. *Galeodes*. Histoire naturelle. Mentions creation of the genus by Olivier out of *Phalangium*, Fabricius. Brief general account. Notices *Galeodes araneoides*, Oliv., and *Galeodes dorsalis*, Latr. References to authors.
156. DUFOUR, LEON. Annales de la Société Entomologique de France. 3me Serie. Tome premier. Paris, 1853.
P. 5. Un mot et un Portrait sur la femelle du *Galeodes barbara*, Lucas. Par M. Leon Dufour. Seance du 11 Aout, 1852.
Pp. 5-8 General account of female, *G. barbara*, Lucas, of which Lucas had only the male; remarks on "les lamelles coxales," and explanation of the figures. [Figure similar to that given in Dufour's Histoire naturelle des *Galeodes*. (171, 176, 177.)]
157. BLANCHARD, E. Comptes rendus Acad. Sci., Paris. Séance 15 Mars, 1852.
Pp. 402-4. Observations on the circulation of the blood of Arachnides, by M. E. Blanchard. [No mention of *Galeodes*.]
158. GIRARD, CHARLES. Exploration of the Red River of Louisiana, in 1852: By Randolph B. Marcy, etc., etc., with reports on the natural history of the country, and numerous illustrations. Washington, 1853. Senate edition. [8½ x 5¼ in.]
P. 262. Arachnidians. By Charles Girard.
Pp. 270, 271. IV. Pseudo-scorpionidæ. Observations on *Galeodes subulata*, Say. Refers to Say's description of *G. pallipes*, and *G. subulata*, in Report of Long's Expedition to the Rocky Mountains in 1819-20. (69.) Detailed description.
159. GIRARD, CHARLES. Marcy's report as above (158) [House of Representatives edition]. 1854.
160. GIRARD, CHARLES. Marcy's report as above (158, 159) [Executive edition]. 1854.
161. SIEBOLD, C. TH. V. Anatomy of the Invertebrata. Translated by Walter J. Burnett, M. D. Boston, 1854.
Not seen. See edition of 1874.
162. OWEN, RICHARD. Lectures on Comparative Anatomy and Physiology of the Invertebrate animals, delivered at the Royal College of Surgeons. 2d ed. Illustrated. London, 1855. [22½ x 14½ cm.]
Pp. 447, 448. Genus *Galeodes*. Characters.
Table of Genera, etc. Characters of *Solpugii* Genus *Galeodes*. First edition, 1843.
163. KNER, RUDOLF. Lehrbuch der Zoologie zum Gebrauche der höheren Lehranstalten. Wien, 1855. [21½ x 14 cm.]
P. 344. Die Familie der Walzenspinnen, der Solpugen, Solifuga, Galeodes, etc., etc. General description and remarks.
[Proc. D. A. N. S., Vol. III.]

164. LUCAS, HIPP. Annales de la Société Entomologique de France. Tome 3me. Séance du 11 Juillet, 1855.
Note by H. Lucas concerning the habitat of *Galeodes barbára*, Lucas, *G. intrepida*, and *G. araneoides*, Pallas; of the latter he describes a female specimen.
165. VAN DER HOEVEN, J. Handbook of Zoology. Vol. I. Invertebrate Animals. Cambridge; London, 1856. [22½ x 14 cm.]
Pp. 584, 585. Order VI. *Solifugæ*. Characters. Family XII. *Galeodea*. Character. *Galeodes*, Oliv., Latr., (Solpuga, Licht.-Fabr.) Definition. References to authors. Remarks on habitat. Mentions an Egyptian species which according to J. Mueller, besides the two larger eyes, has two smaller eyes on pedicels, and two lateral eyes. Remarks on venom of the bite. Division into sub-genera. [No date.]
166. DALLAS. Circle of the Sciences; a Cyclopædia of * * * * Philosophy and Natural History, etc., etc. Edited by James Wylde, etc. Vol. III. London and New York. No date.
P. 3. Introduction. The section on Zoology is stated to be by Mr. Dallas.
P. 168. Classification adopted. Class VI. Arachnida with sub-classifications.
P. 170. Order III. Adelarthrosomata. Phalangidæ, Cheliferidæ, and *Solpugidæ*. Brief general account of the *Solpugidæ*, and of *Galeodes araneoides* [fig. 151], which attains a length of two inches. Fig. 151, an outline copy of Walckenaer's Pl. 26, Fig. 1, R. (126.)
167. ADAMS, BABIE and BARRON. The English Encyclopædia. Conducted by Charles Knight. Natural History. Vol. IV. London, 1856.
[Natural History division, edited by Dr. Edwin Lancaster.]
P. 1087. Trachearia, a subdivision of the great class Arachnida. Gives synopsis of the families from the Manual of Natural History, by Messrs. Adams, Babie and Baron.
Order II. Family I. *Solpugidæ*. False scorpions. Characters. Family III. Cheliferidæ, Book-scorpion. Family III. Phalangidæ, Shepherd-Spiders.
168. KIRBY, WM., and SPENCE, WM. Introduction to Entomology. 7th ed. London, 1859. [7¼ x 4½ in.]
P. 66. *Galeodes araneoides*. Quotes Fabricius (30.)
Galeodes . . (*fatalis*). Quotes Lichtenstein (27.) Same as in other editions.
169. LUCAS, H. Annales de la Société Entomologique de France. Séance du 14 Mai, 1856.
An article from M. Lucas upon *Galeodes barbára*, and *Galeodes melana*, of which he presents specimens discovered by M. Ducoiret in the environs of Sphax in Tunis, and which he mentions as very curious from the point of view of geographical entomology.
170. KOCH, L. Die Thiere Andalusiens nach dem Resultate einer Reise zusammengestellt nebst den Beschreibungen von 249 neuen oder bis jetzt noch unbeschriebenen Gattungen und Arten, von Wilhelm G. Rosenhauer, Erlangen, 1856. [22 x 13 cm.]
Pp. 406-411. Arachnoidea. Herr Dr. L. Koch in Nurnberg investigated and described the Arachnids, etc.
Trachearia. *Gluvia minima*, Koch, described.
171. DUFOUR, LEON. Annales de la Société Entomologique de France. 3e S., T. 5me, 1857. Mélanges Entomologiques. Séance du 12 Novembre, 1856.
Pp. 64-68. IV. *Galeodes phalangista* de l'Algerie, female Pl. 4, Nr. 11. *Solpuga phalangista*, male, Savigny, Egypt. Apter. Pl. 8, fig. 10 (49.) Latin diagnosis, and lengthy French description. Compares it with other species. A foot-note refers to

M. Lucas, and the two species figured by him, *G. barbara*, and *G. intrepida* (142). Of the latter the author claims the discovery, and M. Audouin applies the name differently. Explanation of figures of Pl. 4, Nr. 2, figs. 1 to 6.

172. LUCAS, H. Histoire physique, politique et naturelle de l'Ile de Cuba, par M. Ramon de la Sagra, etc. Paris, 1857. [24 x 16 cm.]
 Animaux articulés par M. F. E. Guérin-Meneville, etc.
 P. X. The description of the Arachnides, etc., by M. H. Lucas.
 P. LXXXI. Arachnides. Genera *Galeode*, *Galeodes*, Olivier (24.)
Galeode de Cuba. *Galeodes Cubæ*, Lucas. Pl. 5, Fig. 6, a, b, and c. Latin description.
 The species discovered in Cuba by M. M. Ricard and Poey.
173. DUFOUR, LEON. Comptes rendus hebdomadaires des séances de l'Académie des Sciences. Tome XLVI. Janvier-Juin, 1858. Paris. [Séance du 28 Juin.]
 Zoologie. Anatomie, physiologie et histoire naturelle des *Galeodes*; par M. Leon Dufour. [Extrait par l'auteur.]
 Pp. 1247-1253. Abstract of the general results, etc., of his paper in memoirs. Mentions *Phalangium araneoides*, Pallas. Speaks of Olivier as "founder of the genus," Savigny as "martyr of the science."
174. DESMAREST, M. E., and CHENU, DR. Encyclopédie d'Histoire Naturelle, ou Traité complet de cette Science d'après les travaux des naturalistes les plus éminents, etc., etc. Paris, 1859. [30 x 21 cm.]
 P. 283. Faux-scorpions. Genre *Galeode* ou *Solpuge*. Defined. Notes on habitat. Mentions that M. M. de Humboldt and H. Lucas have discovered several American species, whose habits are little known. Quotes from Capt. Hutton (121), M. M. Olivier, Koch (116), and Fabricius.
175. BLANCHARD, ÉMILE. L'organisation du Règne Animal. 13e livr. Arachnides, Livr. 7e. Paris, 1861. [?] [37½ x 28 cm.]
 Arachnides, Pl. 25. *Galeodes*, Latreille. With eleven figures. Systeme tegumentaire. [*Galeodes araneoides*, Olivier d'Égypte.] On the anatomy of the Arachnids, especially of the mouth-parts, and nervous system; with references to former articles by himself and other authors.
 Arachnides, Pl. 28. [21 livr., Arach., Livr. 10e.]
 Organs of vision, and digestive apparatus of the *Galeodes*.
 Pl. 26. [27 livr., Arach., Livr. (13.)] Muscular and nervous systems.
176. DUFOUR, LEON. Anatomie, Physiologie, et Histoire Naturelle des *Galeodes*. Paris, 1861. Extrait du Tome XVII des Mémoires présentées par divers savants à l'Académie des Sciences.
 Pp. 1-109. Describes in detail each organ and its parts. Quotes from various authors, comparing their investigations, opinions, and illustrations of the *Galeodes*. Gives a history of their customs, habits, modes of life, and localities. History of the genus; and of the species, with anatomy of several species. Four plates containing twenty-seven figures, by L. Dufour.
 Pp. 39, 40. List of forty-six species, with localities.
177. DUFOUR, LEON. Mémoires présentées par divers savants à l'Académie des Sciences de l'Institut Impériale de France, etc., etc. Tome 17e. Paris, 1862.
 Pp. 338-446. Anatomie, Physiologie, et Histoire Naturelle des *Galeodes*, par M. Leon Dufour.
178. WOOD, REV. J. G., and HEARSAY, LT. GEN. SIR J. The Illustrated Natural History, with new designs, by Wolf, etc. Reptiles, fishes, mollusks, etc. London, 1863. [25½ x 17 cm.]

Pp. 678-689. General account of the appearance of the *Galeodes*. Observations of Lt. Gen. Sir J. Hearsay, on the *Galeodes*, and habits. Quotes from Hutton. Figure of *Solpuga araneoides*. Observations and localities.

179. LATREILLE, PIERRE ANDRÉ; WESTWOOD, J. O. & Co. The Animal Kingdom, etc., by Baron Georges Cuvier. New edition, with additions, by W. P. Carpenter, and J. O. Westwood. London, 1863.

[Translation from Le Règne Animal, 1829 (83.)]

P. 467. The first family of the Trachean Arachnida. The *Pseudo-Scorpions*. Characters. *Galeodes*, Oliv. *Solpuga*, Licht-Fabr. Characters. [Translated by J. O. Westwood, who adds notes on species figured by Savigny and Lucas. Mentions a specimen forwarded from Demarara by Dr. Schomburgh, to the London Entomological Society.

P. 639. Note on revision of Genus *Galeodes*, by Koch. Observations of Capt. Hutton and Col. Hearsay, and reference to M. Blanchard's anatomy of the genus (130.) One figure.

180. GIEBEL, C. G. Die Naturgeschichte des Thierreichs, 4ter Theil. Leipzig, 1863.

P. 388. Fourth Family. *Solpugidae*. Characters, and briefly the distinctive variations defining the genera.

Figure 494. *Solpuga melana*, appears to be copied from Walckenaer's Atlas, Pl. 27, fig. 2 D.

181. BECKER, A. Bulletin Soc. Imp. de Moscou. Tome 37, 1864.

Pp. 477-493. Naturhistorische Mittheilungen.

P. 486. June 17. Remarks on the inability of the *Solpugidae* to endure captivity.

182. FRITSCH, DR. GUSTAV. Berliner Entomologische Zeitschrift, Herausgegeben von dem Entomologischen Vereine in Berlin. Elfter Jahrgang. Redacteur, Dr. G. Kraatz. Berlin, 1867. [19½ x 13 cm.]

Pp. 246-277. Das Insektenleben Sud-Afrikas. Eine biologische Skizze von Dr. Med. Gustav Fritsch in Breslau.

P. 251. Remarks on the *Galeodes*, their characters, pugnacity, etc., and on the poisonous bite of the Indian species, *S. fatalis*.

183. BLANCHARD, EMILE. Metamorphoses, Moeurs et Instincts des Insectes, Myriapodes, Arachnides, Crustacés. Illustré de 200 figures. Paris, 1868. [25½ x 17 cm.]

P. 689. General statement of the order Tetraceres, comprising the single family of *Galeodides*, brief remarks on their form, etc. Mentions *Galeodes barbara*, Lucas, of Algeria.

[Second edition, Paris, October, 1877, a reprint of the first unaltered.]

184. KOLB, C. F. A. Naturgeschichte des Thierreichs. Stuttgart, 1868. Quarto.

P. 168. 3 Familie, *Solpuginæ*. Briefly defined.

Galeodes, Latr., Walzenspinne, only genus.

G. araneoides. Brief description.

Taf. 66. Fig. 5. VI. Arachniden. 5. Walzenspinne.

[Copy of figure of *G. araneoides* from Walckenaer.]

185. WOOD, HORATIO C., JR. Communications of the Essex Institute. Vol. VI, 1867-1870. Salem, 1871. Part I, 1868-March, 1870.

Pp. 10-40. II. On the Phalangæ of the United States of America. By Horatio C. Wood, Jr., M. D. [Communicated December 9, 1867.]

Pp. 12, 13. Remarks on the structure of the *Galeodes*, as somewhat approaching that of the hexapods; mentions *G. subulata*, Say, as the only species seen, which has not (as have some foreign species), rudimentary antennæ attached to the cheliceres.

186. STOLICZKA, F. Journal of the Asiatic Society of Bengal. Volume XXXVIII. Part II. Nos. 1 to 4, 1869. Calcutta. [22 x 13 cm.]

Pp. 231-240. Contribution towards the knowledge of Indian Arachnides; by F. Stoliczka, Ph. D., F. D. S., etc. [Plates XVIII-XX.]

Order, *Solifuge*. Family, *Galeodidae*.

General remarks. Mentions Koch's monograph, and works of Gervais and Walckenaer. Brief descriptions of genus *Galeodes*, Oliv.; *G. fatalis*, Herbst.; *G. brevipes*, Gervais; *G. vorax*, Hutton; and *G. orientalis*, Stol., Pl. XVIII, Figs. 4, 5, with detailed description of female, and comparison with male of the latter species. Compares it to the species nearest *G. araneoides*, Pallas, from which Koch considered it distinct and named it *G. arabs*.

187. TASCHENBERG, C. L. Illustirtes Thierleben. eine allgemeine Kunde des Thierreichs, von A. C. Brehm. 1869.

[Spinnenthier, von C. L. Taschenberg.]

Pp. 564-7. Die Skorpion-spinne (*Solpugina*.) Characters. Mention of *G. araneoides*, a species (illustrated) from South Russia, and one from Cairo. Abstract of Pallas' account. Mentions *G. vorax*, Hutton, which may be *G. fatalis*, Herbst. Koch's division noticed. *G. striolata* in Portugal only European species besides *Galeodes cræcus*.

188. PACKARD, DR. A. S., JR. Guide to the Study of Insects, etc. 11 plates. 650 wood cuts. Salem and London, 1869.

P. 655. *Solpugidæ*, Gervais. Characters. Mentions *S. araneoides*, Pallas, and *S. (Galeodes) americana*, Say. 2d edition, 1870. 3d edition, 1872.

189. NICHOLSON, H. A. Manual of Zoology, etc. 1st edition, 1870. 2d edition, 1872. Second edition, revised and enlarged. New York, 1877. [7¾ x 5 in.]

P. 241. Family 3. *Solpugidæ*. Characters.

190. PROCEEDINGS OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA. 1871. P. 295. November 7th, 1871.

Mention of the exhibition, by Prof. Cope, of a specimen of *Galeodes*, probably *G. pallipes*, Say, from Denver, Colorado. It is common there, and destructive to bed-bugs.

191. SIMON, EUGENE. Annales de la Société Entomologique de France. Ve serie. Tome 2, 1872. Pp. 245-266.

Arachnides de Syrie, Rapports par M. Charles Piochard de la Brulerie. (Scorpions et Galeodes). Par M. Eugene Simon. Seance du 8 Mai, 1872.

Pp. 261-266. Order V. Tetracera. 1. *Galeodes syriacus*, sp. nov. Detailed description. Mentioned as nearest to *G. dorsalis* of Spain. Comparison of *G. dorsalis*, Latr., with *G. intrepidus*, Dufour; also the latter with *G. barbarus*, and describes the latter. Synonymy of *G. dorsalis*, Latr., and *G. barbarus*, Lucas.

2. *Galeodes fuscillatus*, sp. nov. Detailed description. Resembles *G. araneoides* and *G. arabs*.

192. SCHWARDA, L. K. Zoologie. II Band. Wien, 1872. [23 x 15 cm.]

P. 53. VI. Ordnung, Solifuge, Scorpion-spinne. Characters.

1 Familie: *Solpugida*, Gervais. Walzenspinne. Description, localities, habits, etc.

Remarks on *Solpuga (Galeodes) araneoides*, Oliv. Fig. 323.

193. BUTLER, A. G. List of the species of *Galeodidae*, with description of a new species, in the collection of the British Museum.

[Read 7th July, 1873.]

Remarks on the elaborate Memoir on this group, by M. Leon Dufour (176), and his list of the species; compares it with that of M. Koch, and accepts provisionally the whole of Koch's genera. Gives a list of fifty-two species, with synonymy, habitat, remarks, and occasional brief descriptions. *G. bengalensis*, (n. sp. described); fig. 3, 3a, 3b, of the mandibles, hind leg, and species natural size.

194. SIEBOLD, C. TH. v. *Anatomy of the Invertebrata*. Translated by Waldo J. Burnett, M. D. Boston, 1874.

P. 365. Sub-order VI. *Solpugidæ*. Characters. Genus *Galeodes*.

Pp. 367-385. Remarks on anatomy of the *Galeodes*, quoting Blanchard (130); Muller, on position of the six eyes (74); Hutton, on independent action of each chelicere (121); and Milne-Edwards.

195. CAMBRIDGE, REV. O. P. *Encyclopædia Britannica, a Dictionary of Arts, Sciences and General Literature*. 9th ed., Vol. II. Boston, 1875.

Pp. 271-299. Arachnida, by Rev. O. P. Cambridge. *Solpugidæ*; characters. Diagnosis of Order IV, *Solpugidæ*. Detailed description of External Characters, and of Internal Structure. Koch's classification of *Galeodes*. Refers to Butler's list. General remarks. Figs. 14 and 15, original, very good, and different from any other published figures of this species.

196. THORELL, PROF. T. *Annals and Magazine of Natural History*. January, 1876.

On the Classification of Scorpions. By Prof. T. Thorell.

P. 6. (Note). Scheme of Class Arachnoidea.

197. POOLE, REGINALD STUART. *Encyclopædia Britannica, etc., etc.* 9th edition. Vol. VII. Boston, 1876.

Article on Egypt, by Reginald Stuart Poole.

P. 713. Remarks on the sting of scorpions, large spiders, and species of *Solpuga*, with remedy (ipecacuanha paste) used for bites of these insects.

198. PUTNAM, J. DUNCAN. *Proceedings of the Davenport Academy of Natural Sciences*. Vol. II. 1876-1878. Davenport, Iowa. Part I, July, 1877.

Pp. 35, 36. (Dec. 2, 1876). Remarks on *Galeodes pallipes*, Say, by J. D. Putnam. Five specimens collected in Colorado. Quotes Say as describing *G. pallipes* and *G. subulata* in Long's Expedition to Rocky Mountains (69). Girard on *G. subulata* in Report Marcy's Expedition to Red River in 1852 (158). Probably different from *subulata*, Say. Packard mentions *Solp. americana*, Say, in Guide to Study of Insects (188). Prof. Cope on *G. pallipes*, from Denver, in Proc. Acad. Nat. Sci., Phil., 1876 (190.) Butler, List of species of *Galeodidae*. 52 species, 18 *Galeodes*, not one from America. Say's species may belong to *Gluvia* (193). Three or four other species (undetermined) may be found in this country. Fig. 1. *Galeodes pallipes*, Say. Note (dated March 15, 1877). *G. subulata* received from Wyoming, probably different genus from *pallipes*.

199. SIMON, EUGENE. *Annales de la Société Entomologique de France*. Ve Serie. Tome 7me, 1877.

Pp. 225-226. Etudes arachnologiques. 6e memoire.

Arachnides nouveaux ou peu connus. Par M. Eugene Simon. Seance du 8 Mars, 1876. Ordre *Tetracera*. 1 *Rhax rostrum-psittaci*, sp. nouv. Detailed description.

200. HARPER'S MAGAZINE. Vol. LV. September, 1877. New York. Editor's Scientific Record.

P. 634. Mention of the American *Galeodes* as studied by Mr. J. D. Putnam. Eighteen species in the old world, but two described by Say, in America. They are confined to Florida, and Central and Pacific coast regions of America.

201. MURRAY, ANDREW. Economic Entomology, Aptera. London, 1877. [20 x 13 cm.]
 Pp. 40-43. Family *Solpugidæ*. Characters. *G. araneoides*, Pall., (with figs. 19 and 20). General account of habits. Quotes from Wood's Natural History (178) account by Col. Hearsay. Mentions uses of palpi, and phosphorescence emitted by them, also manner of using the mandibles, and carnivorous habits of the species.
202. HUXLEY, THOS. H. Manual of Anatomy of Invertebrated Animals. New York, 1878. [12mo, 596 pp.]
 P. 226. Galeodes compared with scorpions and pseudo-scorpions. Characters. Divisions of Arachnida.
203. PACKARD, DR. A. S., JR. Annual Record of Science and Industry for 1877. Edited by Spencer F. Baird, and others. New York, 1878. Zoology, by A. S. Packard, Jr., M. D.
 P. 317. Same as in Harper's Monthly, September, 1877 (201.)
 P. 318. Mentions whip-tail scorpion. *Thelyphonus giganteus*, of New Mexico, allied to the *Galeodes*.
204. NICHOLSON, HENRY ALLEYNE. Manual of Zoology, etc. Fifth edition. Revised and enlarged. Edinburgh and London, 1878. [19½ x 13 cm.]
 Pp. 301-307. Remarks on structure of *Galeodes*: characters of Family 3, *Solpugidæ*, and of the genus *G. araneoides*, with fig. 149, D, of the latter.
205. CLAUS, DR. C. Traité de Zoologie, etc. Traduit de l'Allemand par Prof. G. Moquin-Tandon. Paris, 1878. [24 x 15 cm.]
 Pp. 528, 529. 8 Ordre *Solifuges*. Characters. General description. Mention of various authors who have written on the *Galeodes*.
 1 Famille. *Solpugides*. Mentions several species; also Koch's divisions into genera.
206. KOCH, L. Naturwissenschaftliche Beiträge zur Kenntniss der Kaukasuslinder, auf Grund seiner Sammelbeute. Dresden, 1878, 8vo.
 (A publication of the Natural History Society "Isis" of Dresden, supplementary to the regular Sitzungsberichte for 1878).
 Pp. 36-71. Article by L. Koch on "Kaukasische Arachnoideen," with two plates. Description of *Gluvia caucasica*, Koch.
207. PUTNAM, J. D. Proceedings of Davenport Acad. Nat. Sci. Vol. II, Part II. June, 1880.
 [November 3, 1877].
 P. 184. [Exhibition of *Chernetidæ* and *Solpugidæ*, by J. D. Putnam]. *Galeodes pallipes* and *G. subulata*, collected by Prof. F. H. Snow in Colorado, and Mr. G. W. Belfrage in Texas, are female and male of one species — *subulata* male, *pallipes* female. *Gluvia geniculata*, Koch, found by Belfrage in Texas.
 [September 14, 1878.]
 P. 270. Remarks, by J. D. Putnam, on Mexican arachnida, collected by Dr. C. C. Parry. Two fine specimens of *Thelyphonus giganteus*, Lucas. (See 204). Also both sexes of a species of *Gluvia* from San Louis Potosi, female appears to be *G. præcox*, Koch. Male to be *G. cinerascens*, Koch. The sexes differing in the structure of the mandibles, as do those of *G. pallipes* and *G. subulata*.
208. PACKARD, A. S., JR. Guide to study of Insects. 6th edition. New York.
 P. 655. Same as second edition, except *G. subulata*, Say, is substituted for *G. americana*, Say, and Southwestern for Southern States.

209. SIMON, EUGENE. Les Arachnides de France. Tome 7me, contenant les ordres des Chernetes, Scorpiones, et Apiliones. Paris, 1879.

P. 77. Note. The Order *Solifuge* (near Chernetes), entirely foreign to the fauna of France. List of species of Mediterranean countries. Mentions three other genera foreign to Europe, *Datames*, *Cleobis* and *Dinorhac*.

210. SIMON, EUGENE. Annales de la Société Entomologique de France. 1879, 5me Série. Tome IX.

Pp. 93-154. Pl. 3. Etudes arachnologiques, 10e Memoire, par M. Eugene Simon, XVI. Essai d'une Classification des Galeodes, remarques synonymiques et descriptions d'espèces nouvelles ou mal connues. [Seance du 11 Septembre, 1878.]

Order *Solifuge*, composed of the single genus *Galeodes*. Classification of Koch, Ger-
vais and Dufour. Synoptical table of genera of *Galeodes*. *Galeodes* defined. Synoptical table of species of *Galeodes*. Synonymy and description of the different species. (This order followed out in each subdivision). Explanations of figures of Pl. 3. Thirty-nine figures of twenty species.

211. KARSCH, DR. F. Stettiner Entomologische Zeitung. 40 Jahrgang. Stettin, 1879. [22 x 13 cm.]

Pp. 106-109. Seven new Arachnides of St. Martha described by Dr. F. Karsch, assistant, Royal Zoological Museum of Berlin. [St. Martha is the capital of State Magdalena, in the South American Republic, New Grenada.]

Gluvia Martha, n. sp. *Hormurus brevicaudatus*, n. sp. Descriptions.

212. CRONEBERG, A. Zoologischer Anzeiger herausgegeben von Prof. J. Victor Carus in Leipzig. II Jahrg. 25 Aug., 1879. No. 36.

Pp. 450, 451. On the Poison-glands of the *Solpuga*, by A. Croneberg, of Moscow. Remarks on poison-glands. Detailed description of those of *S. araneoides*. Quotes many authors on the subject.

213. KARSCH, DR. F. Archiv fur Naturgeschichte. Troschel. 46ter Jahrg. 2ter heft, 1880.

Pp. 238-243. Zur Kenntniss der Galeodiden. Tafel X. Figs. 1-25. Von Dr. F. Karsch in Berlin.

[This paper is based on Lichtenstein's types in the Berlin Museum].

Review of M. E. Simon's Essai (211). Bibliographical history of the formation of the genera *Galeodes* and *Solpuga*.

Comparison of Lichtenstein's types with descriptions of other authors. Remarks on the different genera and their species. Discusses classifications of various authors with a view to a natural classification. Also value of Koch's character of the number of tarsal joints. Summary, based on Koch's types. Description of eight new species. Explanation of the figures of Tafel X, figs. 1 to 25.

214. CRONEBERG, A. Archiv fur Naturgeschichte. Troschel. 46ter Jahrg. 3ter heft.

Pp. 285-300. Ueber die Mundtheile der Arachniden. Von A. Croneberg, in Moskau. Hierzu Tafel XIV bis XVI. 1880.

Mouth-parts of *Androctonus*, *Galeodes*, *Chelifer*, *Atypus*, *Phalangium*, Embryo of *Dendryphantes*.

215. TIJDSCHRIFT VOOR ENTOMOLOGIE UITGEGEVEN DOOR DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING, ETC. 23ste Deel. Jahrg. 1879-80. 1e Aflevering. Gravenhage, 1880.

P. LVI. Proc. of Davenport Acad. Nat. Sci., Vol. II, Part I. Remarks on *Galeodes pallipes*, Say, by J. D. Putnam.

216. ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Announcement of the annual meeting of August 24th, 1880: "Mr. J. D. Putnam, if able to attend, will present some notes on the North American *Galeodes* (*Solpugidæ*), and exhibit specimens in illustration."

217. THE CANADIAN ENTOMOLOGIST. Vol. XII. Edited by Wm. Saunders. London, Ontario. No. 9, September, 1880.

P. 161. Annual meeting of the Entomological Club of the American Assoc. for Advance. Science. [Boston, August 24, 1880.]

P. 168. Mr. J. D. Putnam, of the Davenport Academy, presented some notes on the North American *Galeodes* (*Solpugidæ*), and exhibited specimens in illustration.

218. THE AMERICAN NATURALIST. Vol. XIV. Philadelphia. October, 1880.

P. 757. Proceedings of the Am. Assoc. Advance. Science, twenty-ninth meeting. Boston, August 25 to September 1, 1880.

P. 760. List of papers read in Section B, Natural History and Geology. Notes on North American *Galeodes* (*Solpugidæ*), J. D. Putnam.

219. THE AMERICAN JOURNAL OF SCIENCE. 3d Series. Vol. XX. No. 118. October, 1880. New Haven.

P. 343. American Association for the Advancement of Science. Boston, August 25 to September 1, 1880.

P. 350. List of papers on Entomology read.

J. D. Putnam. Notes on North American *Galeodes*.

220. MANN, B. P. The American Entomologist, etc. Edited by Chas. V. Riley. Washington, D. C., New York. Vol. III. November, 1880.

P. 272. Proceedings of Seventh Annual Meeting of the Entomological Club of the Amer. Assoc. Advance. Science.

[Minutes furnished by B. P. Mann, Sec'y.]

P. 273. Paper on North American *Galeodes*, by Mr. Putnam, of Davenport, Iowa. Dr. Mark remarked that the poison-glands of the *Solpugidæ* had formerly been considered salivary glands.

Remarks by Dr. LeConte on habits of a species of *Galeodes*. He regarded them as probably poisonous, as he had received a series of bites at intervals of an inch and a half along his arm, and knew of no other insect likely to make such an attack.

221. SIMON, M. EUGENE. Annales de la Société Entomologique de France. 1880.

P. 377. Etudes Arachnologiques. 12e Mémoire, par M. Eugène Simon.

Pp. 399-402. Descriptions de deux nouveaux genres de l'ordre des *Solifugæ*. Séance du 25 Février, 1880.

Genre *Blossia*, nov. gen. Description and comparison with other genera.

Blossia spinosa, sp. nov. of Lower Egypt. Description.

Genre *Barrus*, nov. gen. Description and comparison.

Note. *Gluvia furcillata*, E. S., returned to genus *Biton*, Karsch; *Biton furcillata*, E. S.

Barrus Letourneuxi, sp. nov. Lower Egypt. Description.

222. PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. Twenty-ninth Meeting, held at Boston, Mass., August, 1880. Salem, 1881. [8vo, 799 pp.]

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P. 671. Titles of other papers read in sub-section of Entomology. Notes on North American *Galeodes*, by J. D. Putnam, of Davenport, Iowa.

223. LANCASTER, PROF. E. RAY. Zoologischer Anzeiger herausgegeben von Prof. J. Victor Carus, Leipzig. IV Jahrg., 11 Juli, 1881. No. 87.

Pp. 263, 264. Gesuch lebender *Scorpione* und in Spiritus gut conservirter Arachniden.

P. 264. Advertisement by Prof. E. Ray Lancaster, University College, Gower street, London, U. C.

Wants to purchase or exchange well preserved alcoholic specimens of Scorpions, Thelyphonus, *Galeodes*, Scolopendra, Julus, etc.

224. PUTNAM, JOSEPH DUNCAN. Proceedings of the Davenport Academy of Natural Sciences. Vol. III, Part III. Davenport, Iowa, 1883. Pp. 249-277. The *Solpugidæ* of America. Papers of J. Duncan Putnam, arranged for publication by Herbert Osborn, M. Sc.

Notes on the *Solpugidæ* of America. Descriptions of *Dalmanes striatus*, Putnam; *D. girardii*, Putnam; *D. constricta*, Putnam; *D. dilatata*, Putnam; *D. cinerea*, Putnam; and "Stimpson specimen;" all new, or supposed to be new species.

Comparison of specimens, with description of *D. californicus*, Simon. List of American *Solpugidæ*, with collections in which specimens are preserved.

Extracts from notes and correspondence relative to *Solpugidæ*, page 270. Bibliography of the *Solpugidæ* (from No. 68 compiled from notes of J. Duncan Putnam, by J. E. Sanders, of Davenport, page 279. Catalogue of Libraries consulted, page 207. Alphabetical List of Authors, page 308. Four plates from original drawings by J. D. Putnam.

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IN WHICH WORKS UPON SOLPUGIDÆ HAVE BEEN EXAMINED.

[This list names only the libraries in which Mr. Putnam consulted the various works, and must be considered as simply showing where he found a certain book, and not all of the libraries in which that work can be found.]

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EXPLANATION OF PLATES.

PLATE I.

- Fig. 1. *Datames striatus*, Putnam. See page 255.
 " 2. " *constricta*, Putnam. See page 258.
 " 3. " *dilatata*, Putnam. See page 259.
 " 4. " *cinerea*, Putnam. See page 260.
 " 5. *Oleobis cubæ* (?) *Stimpsoni*, Putnam (?). Enlarged. Drawn from Wurdeman specimen. See pages 261-4.
 " 6. *Datames pallipes*, Say. ♀.

PLATE II.

- Fig. 7. *Datames striatus*. Side view, head of ♀, x $7\frac{3}{4}$.
 From specimen in B. S. N. H. See page 255.
 " 8, 9, 10, 11. Legs of above, x $7\frac{3}{4}$.
 " 12. *Datames Girardii*. Side view mandible and diagram of under teeth. ♂.
 " 12a. Tarsus and claws of above, pp. 257, 258.
 " 16. Under side of abdomen, showing male sexual organ and spiracles.
 " 13. *Datames constricta*. Side view mandible and diagram of molar teeth, p. 258.
 " 13a. Tarsus and claws of above, p. 259.
 " 14. Metatarsus of max. palpus, showing scales, p. 259.
 " 15. *Datames dilatata*. Side view of mandible, p. 259.

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- Fig. 17. *Datames cinerea*. Side view of mandible: *a*, diagrams of teeth; *b*, under side of upper jaw, showing hollow cavity into which the teeth of lower jaws set—all enlarged, p. 261.
 " 18. Dorsal view of head of above, enlarged.
 " 19. Stimpson specimen, pp. 261-6.
 " 20. Mandibles and diagram of teeth of above, enlarged.
 " 21. Wurdeman specimen. Side view head, x $7\frac{3}{4}$.
 " 22. Side view max. palp. of above, x $18\frac{3}{4}$.
 " 23. End view max. palp., x $18\frac{3}{4}$.
 " 24. Front view max. palp., x $18\frac{3}{4}$.
 " 25. Mouth parts of above, enlarged.
 " 26. Head of above, enlarged.
 " 27. Tarsus. First legs.
 " 28. " Second legs.
 " 29. " Last "
 " 30. " " " above.
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 " 34. Right chela, inside.
 " 35. Dorsal view of head.
 " 36. Mouth parts, x 8.
 " 37. Right max palp., x $2\frac{1}{8}$.
 " 38. First leg, x $2\frac{1}{8}$.
 " 39. Second leg, x $2\frac{1}{8}$.
 " 40. Third leg, x $2\frac{1}{8}$.

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